

# CHAPTER 1

## THE BOAT

### 1-1 INTRODUCTION

The Navy 44 is the latest of three generations of one-design offshore cruiser/racers to be authorized by the Congress for training midshipmen. The end of World War II brought the first fleet of 12 matched 44' wooden yawls to the Naval Academy, designed by Naval Architect Bill Luders. After 25 years of hard service they were replaced by 12 fiberglass Luders 44' Yawls, designed with the same exterior lines as the original boats, but with an interior that accommodated an auxiliary engine and a navigation space with chart table. After 25 years of offshore and Chesapeake Bay sailing, these boats were ready for replacement.

The lessons learned in over 40 years of sailing and maintaining these and other boats in the Naval Academy fleet were translated by Captain John Bonds, USN, Commodore Naval Academy Sailing Squadron, into specifications for a design competition paid for by the Naval Academy Sailing Advisory Committee (Fales Committee) under the chairmanship of Mr. Charles L. III.

The firm of McCurdy & Rhodes, Inc. of Cold Spring Harbor, New York, won the competition for the designer. The construction contract was awarded to Tillotson-Pearson, Inc. of Warren, Rhode Island. The first boat was delivered in 1987. The Fales committee and Capt. Bonds carried out testing of the prototype and subsequent design modifications.

The Navy 44 has proven to be a very successful design, being seaworthy, strong and stable in the worst weather, fast and comfortable and with the rig and interior arrangement planned to meet the single-minded objective of midshipman training.

The Navy 44 was acquired in two incremental buys; NA-1 thru NA-8, NA-9 thru NA-20. The configuration of each increment reflected "state of the art" modification to the basic boat available at the time of procurement. The fleet of 20 NA 44's exhibits the following characteristics:

NA-1 is the prototype. The most obvious peculiarity is that the cabin has a teak sole. Cabin layout is peculiar to this boat only.

NA-2 is the test bed for the Naval Academy. Before modifications to the fleet of the Navy 44 are made they are proven on this boat. Peculiarities include:

- A LECTRASAN treatment system for the marine head to sanitize feces prior to discharge from the boat overboard.

- A unique charging system for the galley refrigeration system.

NA-1 thru NA-8 are fitted with the Brooks and Gatehouse HYDRA depth sounder and the HORNET sailing instrument systems. The location of components for the plumbing system is peculiar to this series.

NA-9 thru NA-12 are configured with a foil headstay for the jib. The jib lead trim system has a shock chord/control line assist for running the car forward thus providing an infinite positioning of the car lead. This series is fitted with the HECTA series sailing and depth sounding equipment.

NA-9 thru NA-20 reflect the newest systems. They are also fitted with the HECTA series. The location of components for the plumbing system is peculiar to this series.

Characteristics of each series are identified in Figure 1-2 PRINCIPAL CHARACTERISTICS.

## 1-2 PRINCIPAL CHARACTERISTICS.

Length, Overall	44 ft. 0 in. (13.42 meters)
Length, Waterline	34 ft. 7 ½ in. (10.56 meters)
Beam, Maximum	12 ft. 4-3/4 in. (3.78 meters)
Draft	7 ft. 3 in. (2.21 meters)
Height, from Waterline	65 ft. (20 meters)
Displacement, Measured Trim	27,654 pounds
Ballast	12,310 pounds
Sail Area, Maximum	956.37 square feet
Engine, Diesel Auxiliary	Westerbeke Model 40NA, 37 H.P. @ 3000 RPM w/1.88:1 HBW 150 Hurth Gear, with Max Prop 19 inch diameter, 18 degree pitch, feathering prop. 50 Gallons (45 useable)
Fuel Capacity	1.5 GPH @ 3000 RPM (maximum power)
Consumption (approx)	.8 GPH @ 1800 RPM (cruise power)
ELECTRICAL	12 volts D.C., 120 VAC, 30 Amp.
Alternators	2 - 51 Amps ea. provide 12 volts D.C.
Batteries	4-Rolls 12 Volt, 136 Amp Hr batteries in 2 banks:
Ship's Service Batteries	Ship Service #1 (2 batteries), Ship Service # 2, (2 batteries).
Engine Start Battery	1- M27 high amperage cranking battery.
COMMUNICATIONS	
VHF	Icom M100 (NA1-NA8) Icom M120 (NA9-NA20) Stephens SEA 222
HF/SSB	
ELECTRONIC EQUIPMENT	
Depth Sounder	Brooks & Gatehouse HECTA (NA1-NA8) Brooks & Gatehouse HYDRA (NA9-NA20) Brooks & Gatehouse HORNET (NA1-NA8) Brooks & Gatehouse HYDRA (NA9-NA20)
Sailing Instrument	Northstar 800
Loran	Raytheon R-20 (NA1-NA8)
Radar	Raytheon R-20X (NA9-NA20)
GPS	Northstar Mod (GPS) NA-9 - NA-12 Trimble (NA2 & NA5)
Weather Facsimile	Furuno FAX 208A (every fourth boat)
Potable Water	163 Gallons in 3 tanks, 23 gal keel, 2-70 gals each under settee berths.
Refrigeration - Original	Gruner Caribbean Model 75 Holding Plate, dual charging; Engine driven mechanical, 115 VAC.
	New system installed in NA-2, NA-8, and NA-15 thru NA-20.
MSD Holding Tank	New - Technautics Coastal 12. 12 VDC
Crew	10 Gallon approximate, PVC
	10

### 1-3 HULL CONFIGURATION & LAYOUT

The Navy 44 has a trimmed waterline length of only 34 feet, 7-1/2 inches, due to a moderate overhang at the bow. A fixed hydrodynamic keel is arranged amidships, which compliments the wine-glass mid-body. Ballast fitted to the keel is 12,310 pounds of cast lead. The rudder is attached to a skeg under the reversed transom. The skeg is molded integrally with the hull. The Navy 44 has a continuous main deck around the raised cabin top and cockpit. Cockpit combing and cabin top are fitted with an array of winches, blocks, cleats and fittings sufficient for offshore training. Deck surfaces are covered with Treadmaster non-skid. The main deck perimeter is fitted with fore and aft stainless steel pulpits, with stanchions that have double life lines port and starboard.

#### 1-3.1 CONSTRUCTION INFORMATION

Basic lay-up of hull is an inner and outer skin of biaxial glass matting and vinylester resin over Airex and Termanto cores. The deck is laid up in a similar fashion as the hull, using a separate mold and joined to the top of the hull at the deck edges. Sufficient biaxial/matting reinforcing is overlapped to assure proper bonding at the joint. See Figure 1-1. Hull and Deck Lay-ups.

The bottom of the hull is constructed to provide a stepped seat for bolting on the 12,310-pound cast lead keel with ten (10) stainless steel bolts. The inner bottom of the hull (below cabin sole) incorporates a hollow fiberglass grid pattern of longitudinal and transverse members bonded to the inner skin that provides the necessary hull stiffness as well as support for the cabin sole. Aft of the keel is a fiberglass skeg, molded integrally with the hull, which supports the rudder with a cast bronze bearing housing. See Figure 1-2. Bottom Grid.

#### 1-3.2 HULL & EXTERIOR ARRANGEMENTS

The Navy 44 is basically divided into three sections:

Deck - Supports the mast at the partners and is arranged with winches, cleats, lifelines, navigation

lights, hatches, and fittings suitable for offshore sailing. See Figure 1-3. Deck, (Top View), and Figure 1-4. Deck, (Side View).

Cockpit - A large well on the afterdeck accommodating the crew that will steer, and work the sails. See Figure 1-5. Cockpit.

Cabin - The cabin is the interior of the boat consisting of habitable spaces, storage, electronics, and auxiliaries. Habitable spaces include berths, head, shower, galley, refrigerator, and folding mess table. Below the cabin sole is the mast step, (day) water tank, fuel tank, bilge pumps, and thru-hull fittings. Water tanks under settee berths. Engine compartment is below the companionway. See Figure 1-6. Cabin.

### 1-4 SPARS

The Navy 44 is a masthead sloop rig whose spars include a single mast, a boom and while sailing with a spinnaker, a spinnaker pole and reaching strut.

#### 1-4.1 THE MAST

The aluminum mast is a total of 64 feet, 3 inches from step to masthead and 62 feet, 4 inches above the waterline. The mast is a Hall Spars section 240 aluminum alloy tube, oval cross-section with an internal track running along the aft side to hold the mainsail's luff slides, with a welded taper at the masthead. A Hall Spars masthead with internal halyard sheaves is welded to the mast top. Aluminum spreaders with airfoil sections and thru-mast mounting are fitted at about the middle and the top quarter of the mast. A separate track is located adjacent to the mainsail track, port side, for the storm trysail. A 12-foot spinnaker pole track with single toggle car is fitted on the forward side of the mast. The mast is internally wired in conduit for navigation lights, deck light, box light, wind instruments and antennas, with wires exiting at the base of the mast.

Figure 1-1. Hull and Deck Lay-ups

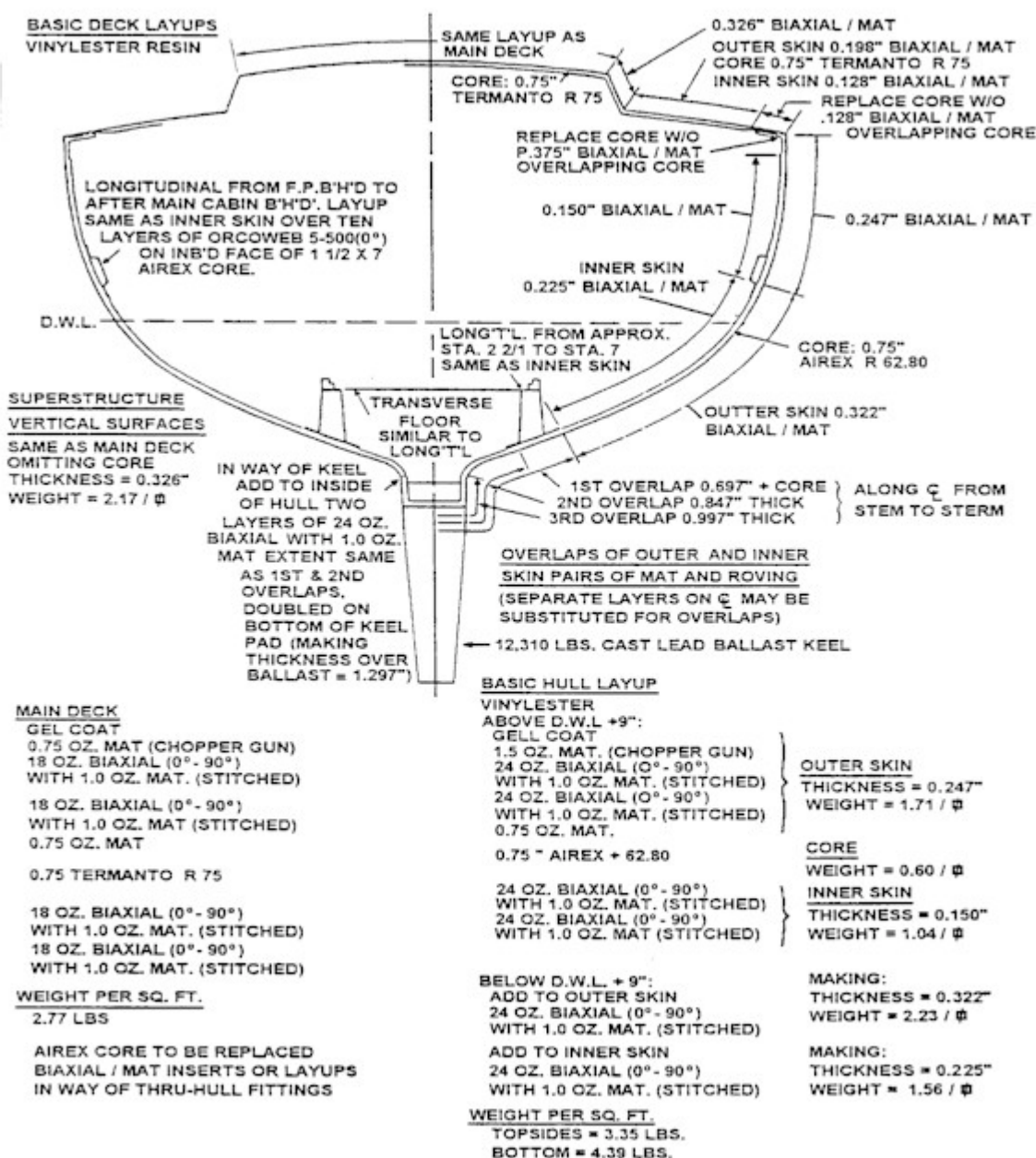


Figure 1-2. Bottom Grid

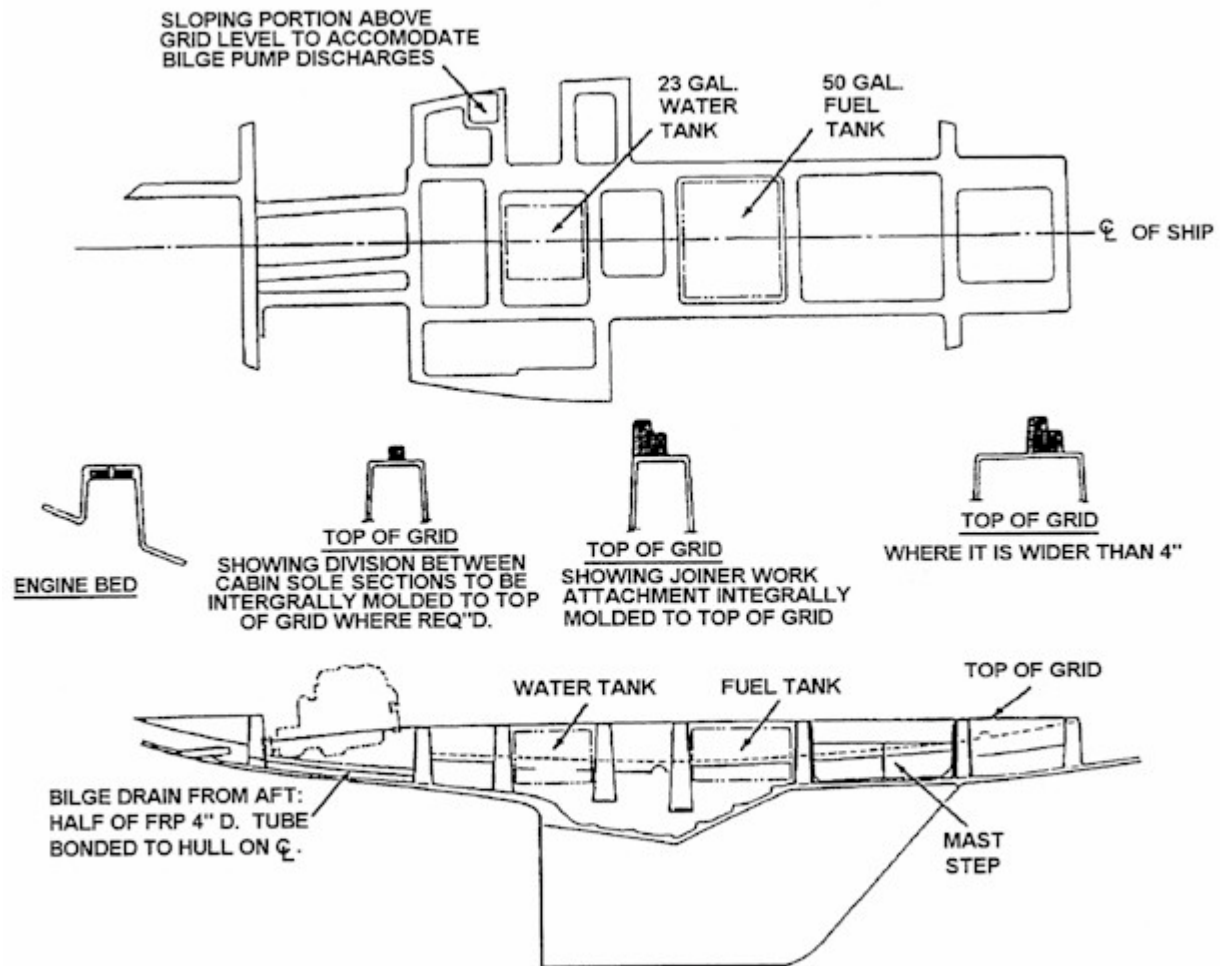


Figure 1-3. Deck Top

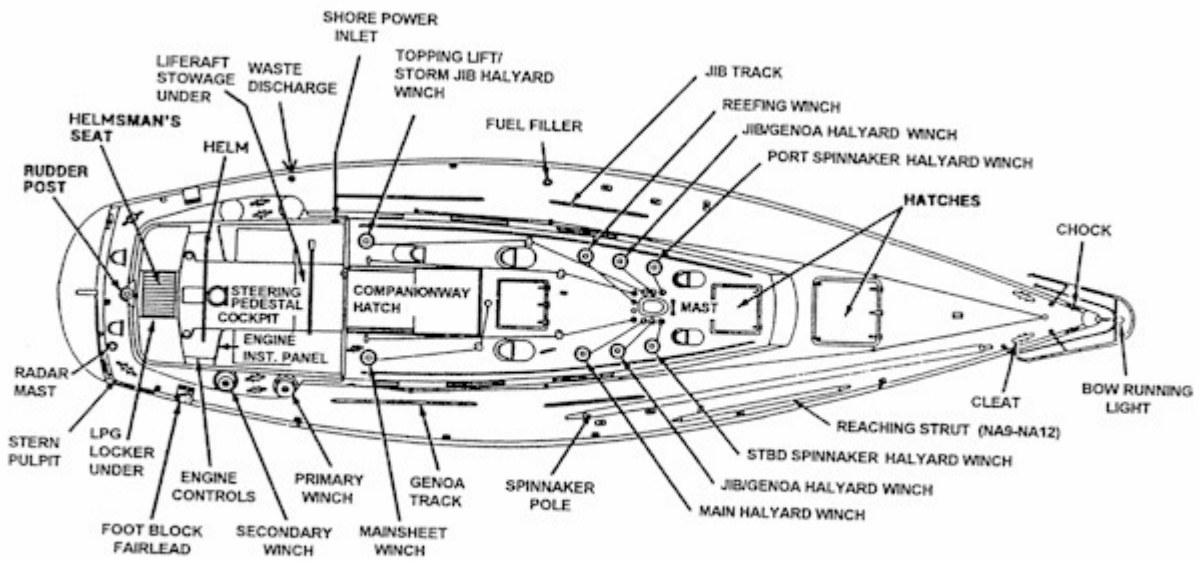


Figure 1-4. Deck Side

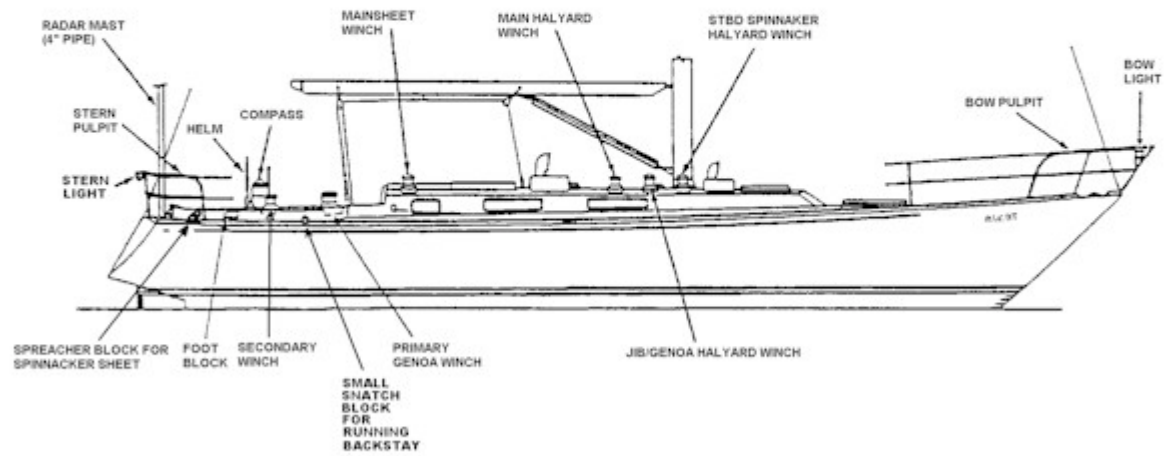


Figure 1-5. Cockpit

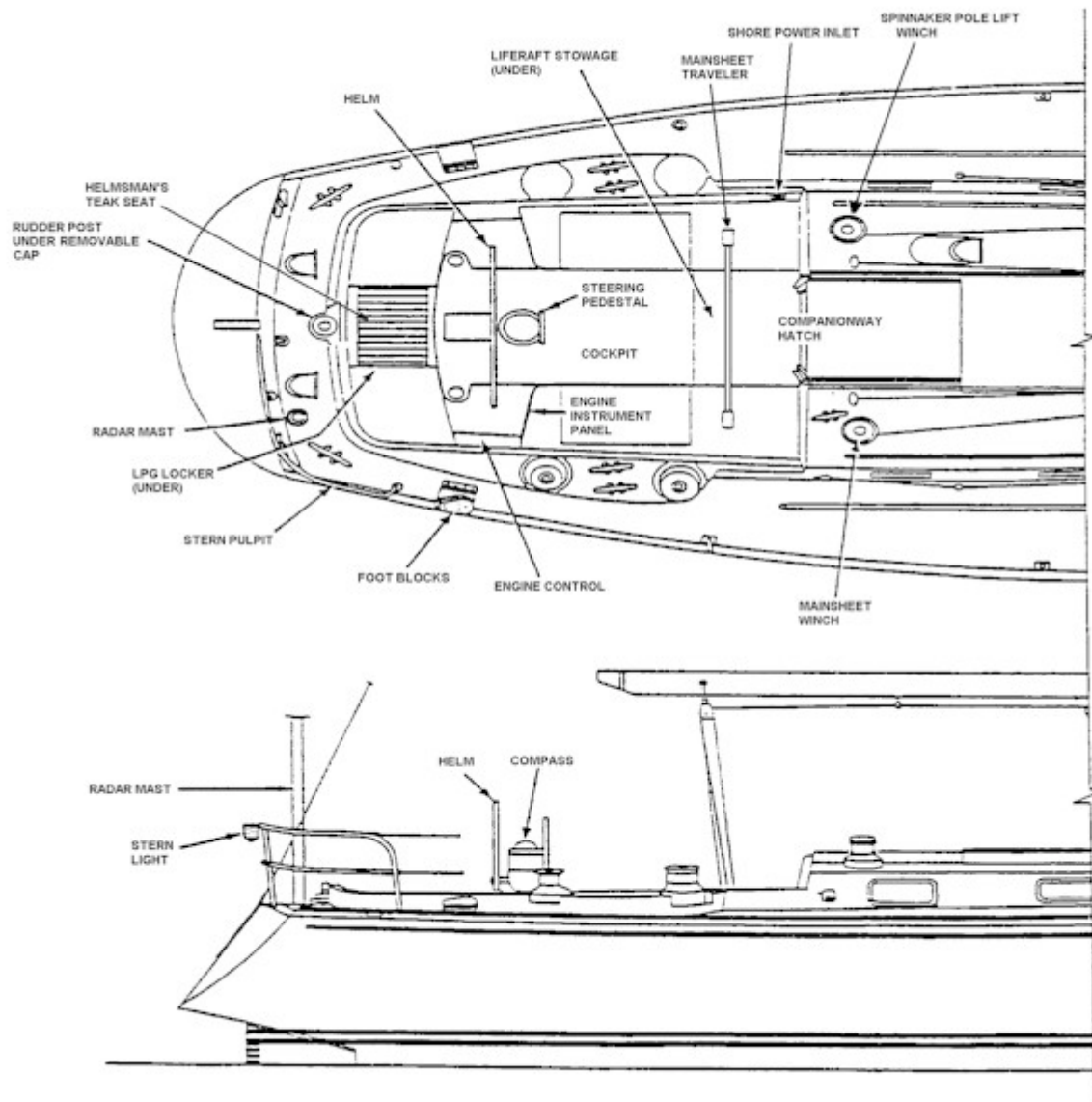
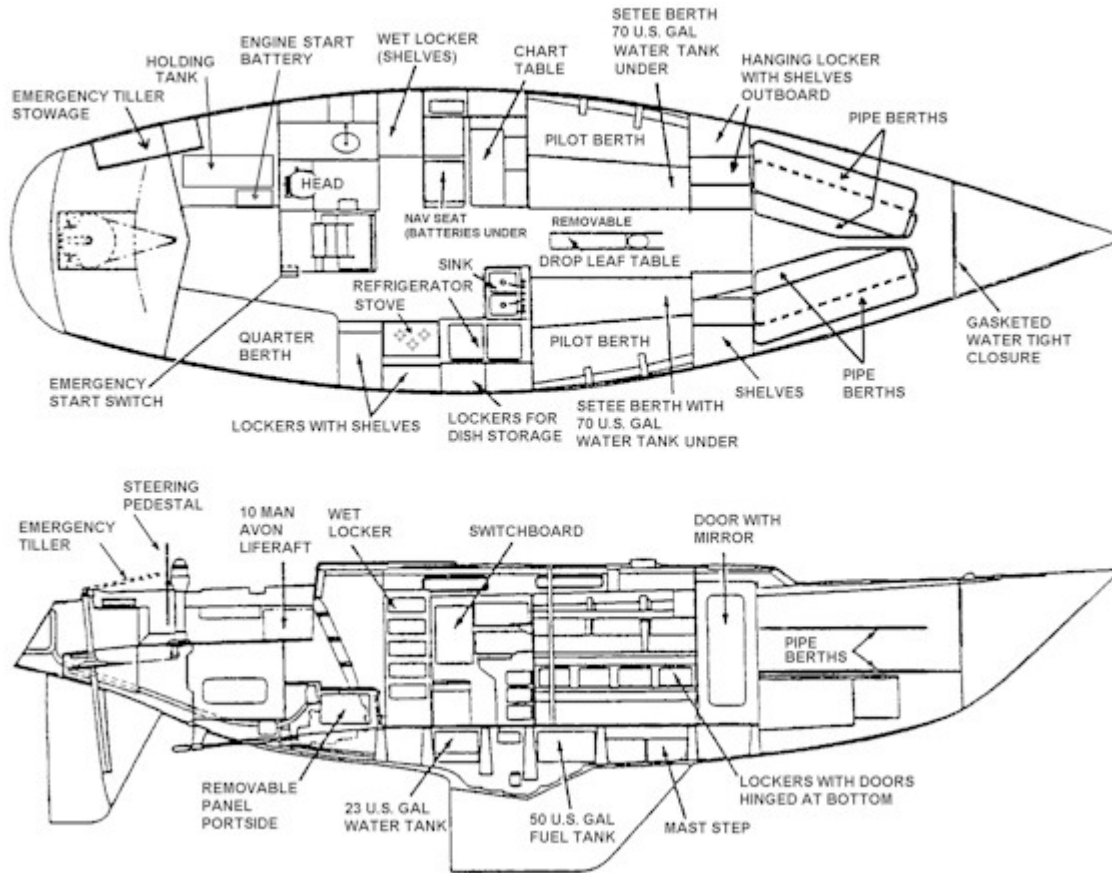




Figure 1-6 Cabin



The mast goes through the deck, is fitted with a mast collar, wedges and a boot for water tight integrity, and is stepped on the keel.

#### NOTE

Controlling height of the mast for bridge clearance is 65 ft due to the electronic wind instrument and VHF antenna at the masthead.

#### 1-4.2 THE BOOM.

The boom is a Hall Spars section 185 aluminum alloy tubing with internal outhaul tackle with two slab reefing sheaves on the aft end and sheaves and cam cleats on the gooseneck end. Two reef locks at the forward end will hold the reef line when set to free the reefing winch for the next evolution. The boom is fastened to the mast with a gooseneck approximately 5 feet above the cabin top and is fitted with a boom vang (Hall Spars Quik Vang, size D40).

#### 1-4.3 THE SPINNAKER POLE

The spinnaker pole is a 4-inch diameter aluminum alloy tubing 18 feet, 4 inches long. Each end is provided with a fitting; the inboard end, a socket, Sparcraft PO114, attaches to the toggle car on the forward side of the mast, and the outboard end of the pole, Sparcraft PO128, is fixed to the outboard end of the pole for the guy of the spinnaker. When not in use, the spinnaker pole is stowed in starboard deck chocks forward of the mast.

#### 1-4.4 THE REACHING STRUT.

The reaching strut is an 8 foot, 3-inch, aluminum alloy tubing, Forespar RS-300-T, with Forespar Model RSO outboard end and Model RST inboard end fittings. The reaching strut can be used when the apparent wind angle is forward of the beam. This reduces chafe on the afterguy, and increases the mechanical advantage of the load on the afterguy to help keep the spinnaker pole from touching the headstay, especially in a seaway. The reaching strut is primarily used while racing.

An alternative method of controlling the afterguy without the use of the reaching strut is to employ a snatch block at the toe rail two holes aft of the lifeline stanchion adjacent to the aft lower shroud.

#### NOTE

Only NA9 thru NA12 are normally fitted with the reaching strut.

#### 1-4.5 THE STANDING RIGGING

The standing rigging on the NAVY 44 is discontinuous NAVTEC nitronic 90 rod rigging with cold-headed ends in stemball mast wall terminals. See Table 1-1. Rod Rigging.

The mast is held vertical by a combination of stays and shrouds that collectively make up the standing rigging. It consists of a permanent rod headstay, a permanent backstay fitted with a hydraulic tensioner, shrouds and spreaders.

The Navy 44 is a masthead rig. The headstay meets the mast hounds at the masthead. An upper shroud, which is attached with a stemball fitting fastened to the masthead, passes through the end of the upper spreaders and attaches to the end of the lower spreader.

The lower vertical shroud attaches to the end of the lower spreader and leads to a chainplate on the deck. This lower vertical shroud also supports the load on the upper diagonal shroud.

The forward lower shroud attaches to the mast below the lower spreader with a stemball fitting and leads to a chainplate on the deck approximately two feet forward of the vertical shroud. An aft lower shroud that attaches to the lower spreader root with a fatigue indicating stemball fitting at the lower spreader leads to a chainplate on the deck approximately two feet aft of the vertical shroud. Each lower stay and upper diagonal stay is fitted with a turnbuckle to adjust tension when "tuning" the mast.

Table 1-1, Rod Rigging

ITEM	SIZE	MATERIAL	QUANTITY
Upper Shroud	-17	NAVTEC 22-13-5	2
Vertical Shroud	-30	NAVTEC 22-13-5	2
Middle Shroud	-12	NAVTEC 22-13-5	2
Lower Shroud	-12	NAVTEC 22-13-5	4
Forestay *	-22	NAVTEC 22-13-5	1
Backstay *	-22	NAVTEC 22-13-5	1
Inner Forestay (Collapsible)	1/4" Dia	1x19 Stainless Steel Rod	1
Running Backstay (Collapsible)	1/4" Dia	1x19 Stainless Steel Rod	2

The ends of the Forestays and Backstays have been cut off to remove the areas of high stress fatigue and a new end has been fashioned using the Cold Rolled process. In order to regain the length lost in this process a toggle has been added to the bottom of the forestays. A toggle and a shackle have been added to the backstay.

Tuning is the process by which the standing rigging is adjusted so that the mast remains in column, directly on centerline when exposed to typical operating loads. The mast has been tuned by Small Craft Support and is not be tuned by using personnel. See Figure 1-7, Typical Turnbuckle, and Figure 1-6, Standing Rigging Front View.

#### 1-4.5.1 STEM BALL FITTINGS

The aft lower shrouds have been retrofitted with a stem ball fitting at the upper end where they join to the mast. This allows the rod end to rotate within a machined stemball seat, thus accommodating small amounts of lateral and fore-aft play in the shroud as the mast is subjected to load. The indicator band will break loose when subjected to inordinate loads and will slide to the lower end of the shroud adjacent to the turnbuckle. This is an indication of inordinate fatigue and potential shroud failure. See Figure 1-9, Stem Ball Fitting.

#### 1-4.6 SPREADERS

The Navy 44 Mast has two sets of aluminum spreaders which extend with a small dihedral angle from the mast at 22 feet and 40 feet above the deck for the lowers and upper sets respectively, thus the rig is referred to as a "double spreader rig". The spreaders assist the shrouds in keeping the mast in column within the fore and aft plane. See Figure 1-8.

#### 1-4.7 THE COLLAPSIBLE INNER FORESTAY

A collapsible inner forestay, of 1/4" - 1x19 stainless steel wire, is attached to the front of the mast with an aluminum welded tang at a point 18 feet, 9 inches below the masthead. The running backstays are attached to the back of the mast at the same location. The lower end is attached to a high field lever. When set up it will lessen the flexing of the mast due to strong winds and seas. It also serves as the stay to which the Genoa staysail or the storm jib are attached. When not in use the lower end can be led through the fairlead at the base of the mast, port side, and attached to the shock chord at the padeye on the cabin top aft of the mast.

#### 1-4.8 THE HYDRAULIC BACKSTAY TENSIONING DEVICE.

The hydraulic backstay tensioning device is used to adjust masthead position and indirectly controls the shape of the leading edge of the jib. The headstay is adjusted to compensate for wind pressure. Light winds may require no more than the 50 psi static pressure. In stronger winds more backstay pressure will be needed.

##### CAUTION

Maximum headstay pressure should not Exceed 4000 psi.

The tensioning device is a manually actuated hydraulic pump which applies tension to the backstay. Each of the two types of tensioners used in the Navy 44 fleet have indicator gauges, and pressure relief valves which prevent accidental application of extreme backstay pressure or the dynamic loads in excess of safe limits. Two types are used. NA1-NA8 have KRUEGER tensioners while NA9-NA20 have NAVTEC tensioners.

##### 1-4.8.1 THE KRUEGER TENSIONER

The Krueger backstay tensioner has a sight gauge to aid in controlling the amount of tension taken on the system. It measures load exerted on the system in thousands of pounds. See Figure 1-10. Krueger Tensioner.

##### 1-4.8.2 NAVTEC BACKSTAY TENSIONER

The NAVTEC tensioner has two scales. One end of the pointer reads pounds per square inch of pressure in the cylinder. the other end indicates the equivalent pressure exerted on the backstay in pounds x1000. See Figure 1-11. NAVTEC Tensioner.

Figure 1-7. Typical Turnbuckle

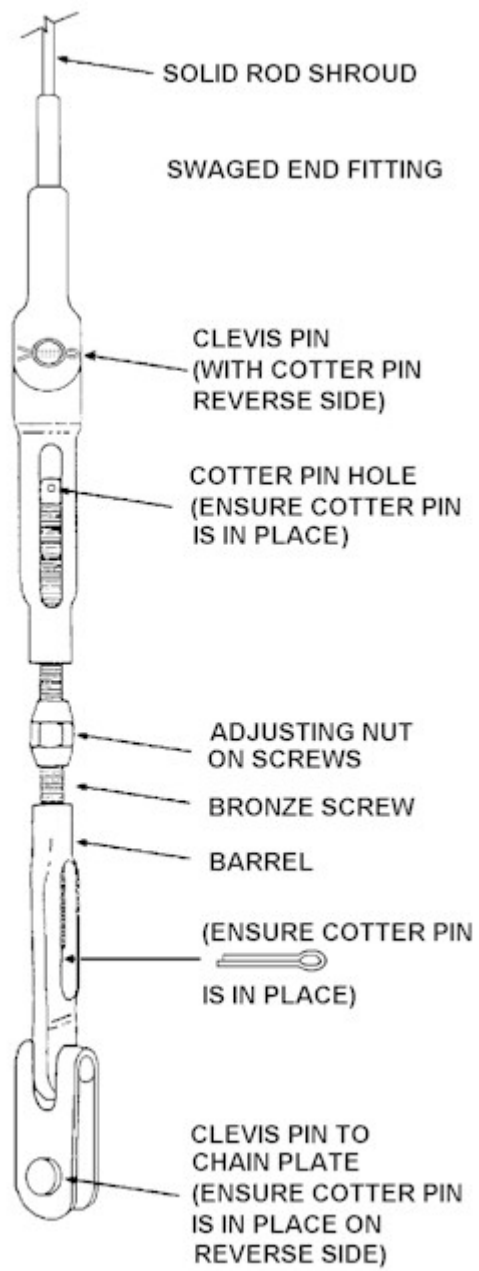


Figure 1-8. Standing Rigging Front View

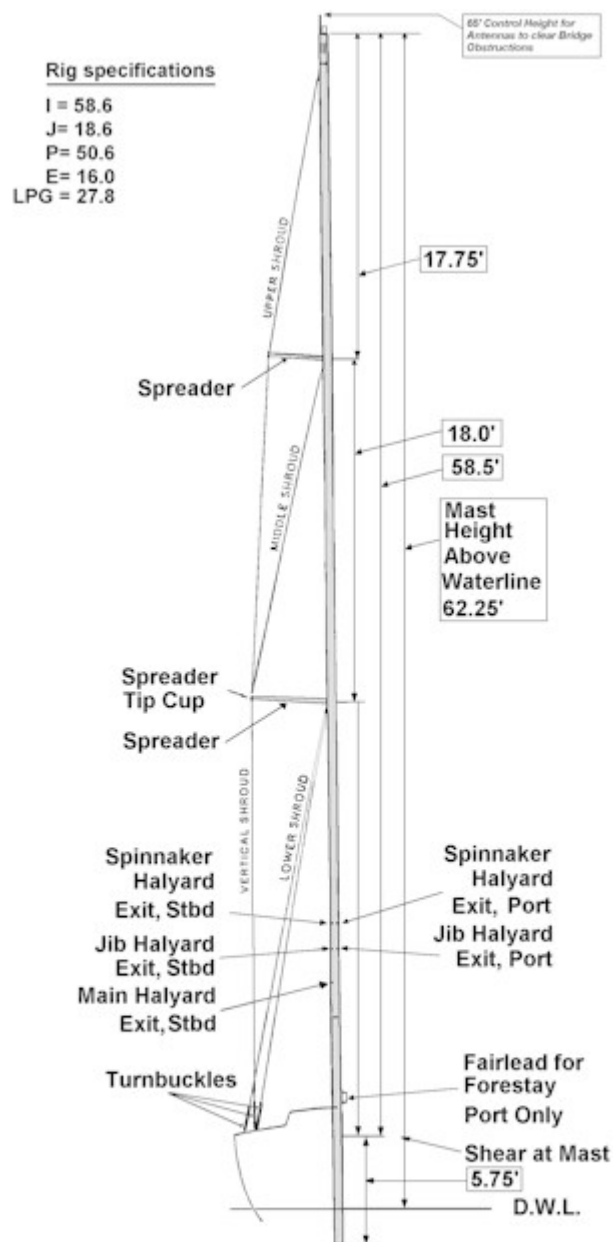


Figure 1-9 Stemball Anti-fatigue Fitting

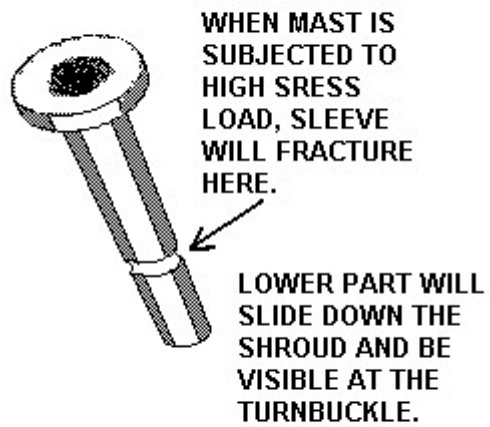


Figure 1- 10. Krueger Tensioner

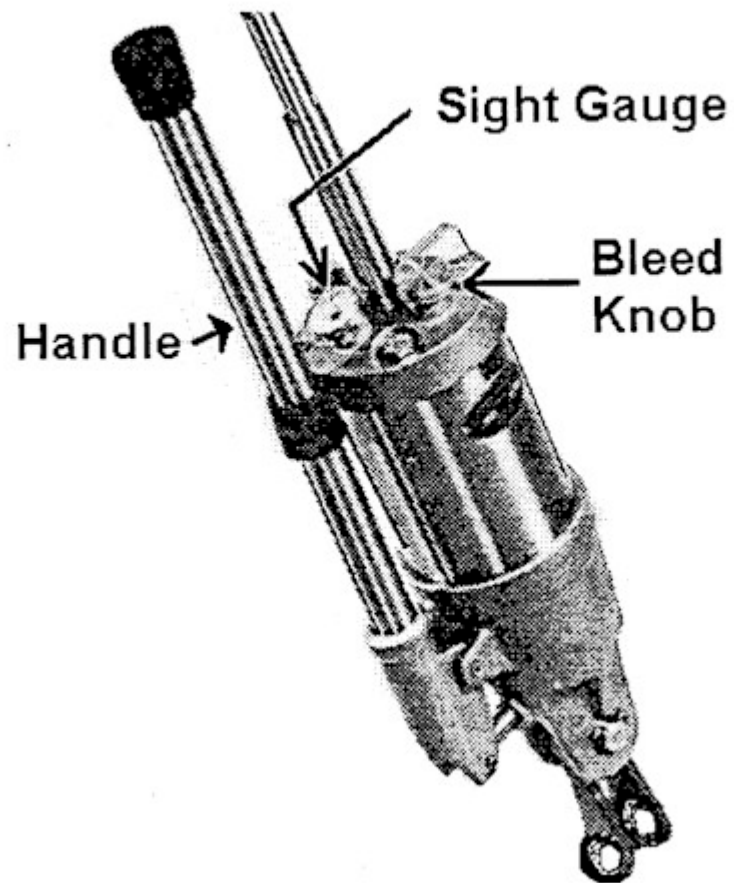
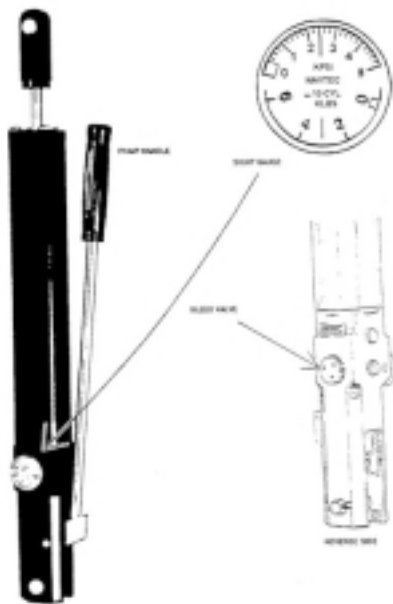




Figure 1-11. NAVTEC Tensioner



#### 1-4.9 WINCHES

To handle the adjustments to the various working lines, the Navy 44 is outfitted with twelve (12) Bariant 2 speed winches located on the cabin top on either side of the cockpit. See Figure 1-12, Typical Winch, and Table 1-2 for a complete listing of the winches installed.

#### 1-5. RUNNING RIGGING

The running rigging consists of the halyards to raise and lower sails; sheets for headsails; traveler and mainsheet for the mainsail, sheets and guys plus spinnaker pole, topping lift, and foreguy (down haul or down guy) for the spinnakers, cunningham, outhaul, reefing lines and running backstays.

##### 1-5.1 THE HALYARDS.

The masthead is fitted with four (4) aluminum sheaves upon which the halyards ride; one for the mainsail, one for the Port jib/Genoa; one for the Stbd jib/Genoa; and one spare. The halyards are rigged internally. These halyards are 3/8-inch Spectra line spliced to 1/2-inch braided Dacron rope tail covers.

There are two spinnaker halyards, that pass through blocks attached to welded cranes on each side of the forward face of the masthead, lead down the inside of the mast and after exiting the mast, are led through turning blocks at the base of the mast, then to winches on the port or starboard cabin top. The spinnaker halyards are 1/2-inch braided Dacron line.

A Spinnaker Topping Lift (T-Lift)/Staysail halyard, is used to provide a lifting force for the outboard end of the spinnaker pole and as a halyard for a staysail. The outboard end is fitted with a swivel snap shackle and lanyard. The line is 3/8-inch Spectra core/Dacron cover line. It is led to a sheave located on the front of the mast just below the Masthead/Deck combination light and forestay attachment where it then proceeds down the inside of the mast, exiting on the lower left side to a deck-mounted swivel turning block.

The line is then led to a port side cabin top winch.

##### 1-5.2 THE RUNNING BACKSTAYS

There are two running backstay, one on each side, attached to the sides of the mast with a GIBB T-BAR terminal, at the same height as the collapsible inner forestay. They help to keep the mast from pumping in a rough seaway. The windward running backstay is set when the Genoa Staysail is used. Both running backstays are set when the storm jib is used. Each running backstay has a detachable "tail" normally stowed in the port cockpit locker. The tail is a 1/2 inch double braided polyester line fitted with a 5/16" SS shackle for attachment to the running backstay. See Chapter 3 for using the Running Backstays with the Genoa Staysail, or Chapter 6 for use with the Storm Jib.

##### 1-5.3 THE TRAVELER.

A traveler is fitted to the bridge deck of the forward end of the cockpit. The car is controlled by a tag line, dead-end spliced to the double cheek blocks at the ends of the traveler track. It is reeved as a 4-part block and tackle to the car, and exits through a cam cleat at the end of the traveler. A similar tag line is attached to the other end of the traveler.

##### 1-5.4 THE MAIN SHEET

The main sheet is attached to the becket of a single block mounted on the car of the traveler, leads to a fiddle block on the aft bale of the boom through a three part purchase, then forward thru a ring fair lead to a single block on the forward boom bale. It then leads down to a single turning block forward of the main companionway hatch cover, to a deck mounted cheek block and to the Cabin Top Self-Tailing winch on the stbd side aft. See Figure 1-5.

Figure 1-12. Typical Winch

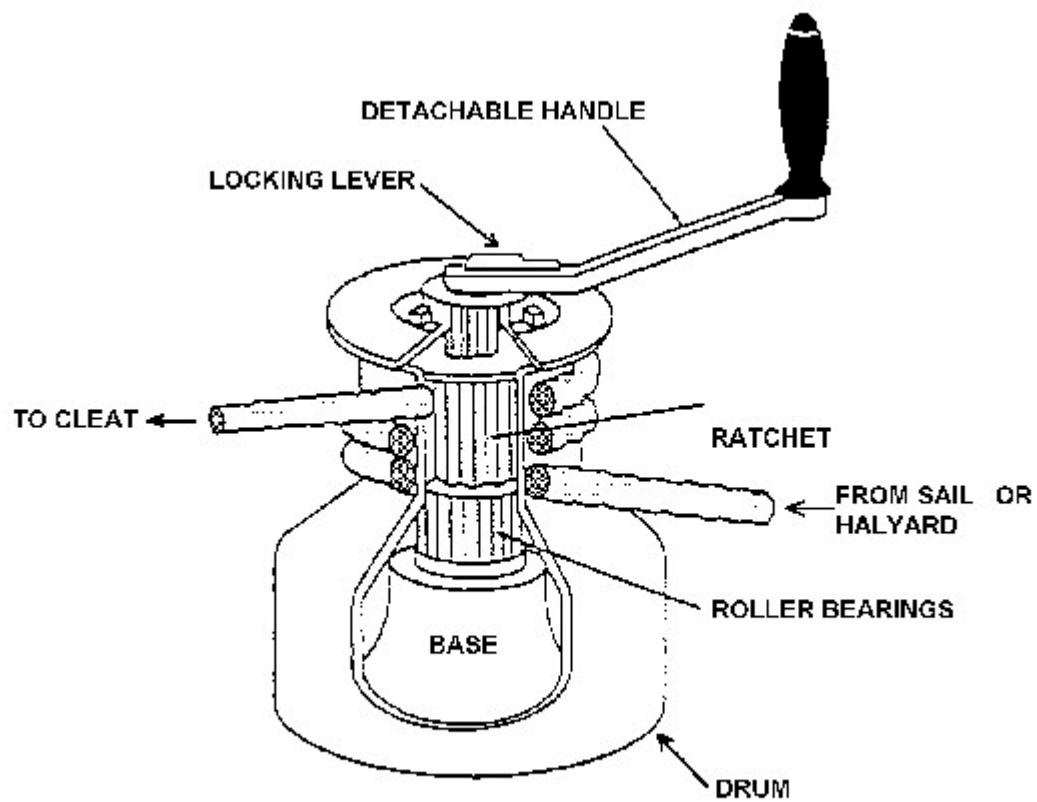


Table 1-2. Winches

DESCRIPTION	QUANTITY	MODEL	LOCATION
SPINNAKER HALYARDS	2	BARIENT 28 ST + SS	CABIN TOP PORT & STBD
GENOA / JIB HALYARDS	2	BARIENT 28 ST+ SS	CABIN TOP PORT & STBD
REEFING LINES	1	BARIENT 28 ST+ SS	CABIN TOP PORT
MAIN HALYARD*	1	BARIENT 28+ SS SOME ARE 28 ST + SS	CABIN TOP STBD
T-LIFT/STAYSAIL HALYARD	1	BARIENT 28 ST+ SS	CABIN TOP PORT AFT
MAINSHEET	1	BARIENT 28 ST + SS	CABIN TOP STBD AFT
PRIMARY GENOAS	2	BARIENT 736 SS/A	COCKPIT COMBING PORT & STBD
SECONDARY GENOAS	2	BARIENT 32 SS	COCKPIT COMBING PORT & STBD

### 1-5.5 THE PREVENTER SYSTEM.

It must be stated that the most effective preventer of an accidental gybe is an alert helmsman; however, recognizing that even an alert helmsman needs assistance, a two part preventer system has been installed on the Navy 44. One part is mounted on the boom, the second is crew deployed on the deck.

Equipment permanently mounted to the Boom.

A pad eye has been installed on the side of the boom at the aft end. A ½-inch high modulus, (aramid), preventer line is attached with a shackle, (exploded view A on Figure 1-13), that leads forward along the outside of the boom to a mid-boom exit box, (exploded view B). Shock chord attached inside the boom at the forward end, (exploded view C), is led aft to the exit box, and out, to attach to the loop spliced on the forward end of the preventer. This holds the preventer close to the boom in the non-deployed configuration. This installation is repeated on the other side of the boom.

Deck deployed preventer line.

A color-coded aramid core/Dacron covered line has a snap shackle fitted to one end. The snap shackle end is rigged to pass out of the cockpit down the deck inside the shrouds to a snatch block attached to the toe rail just aft of the bow pulpit, (exploded view D). The line goes thru the snatch block, passed outside the toe rail, then led aft, outside the shrouds. At rest the snap shackle is attached to the lower lifeline aft of the stanchion located just aft of the aft lower shroud, (exploded view E). The bitter end is led aft to a winch on the cockpit combing, (exploded view F).

To use the preventer, the snap shackle is disconnected from the lifeline and attached to the forward end of the boom mounted aramid line. The shock chord is then disconnected from the aramid line. A companion line is rigged to

the opposite side of the deck. See Figure 1-13, Preventer.

### 1-5.6 THE JIB / SPINNAKER SHEETS AND GUYS.

Sheets and guys are color-coded as follows:

Jib/Genoa Sheets - Color fleck (5/8"x65'  
Braided Dacron)

Spinnaker Sheets - Color fleck (½"x88'  
Braided Dacron with snap shackle)

Spinnaker Guys - Color fleck (½"x88'  
Braided Kevlar fitted to a snap shackle).

### 1-5.7 REEFING LINES

The Navy 44 is equipped with a double reefing system internal to the boom. The first reefing line leads to a deck mounted swivel block at the base of the mast, up to a sheave in forward end of the boom, into the boom through a rope clutch, exiting to a sheave at the aft end of the boom. The second reefing line has the same run pattern but is rigged on the port inside of boom. When not in use the reefing lines secured at the aft end of the boom with a figure eight knot to keep it from running out through the sheave.

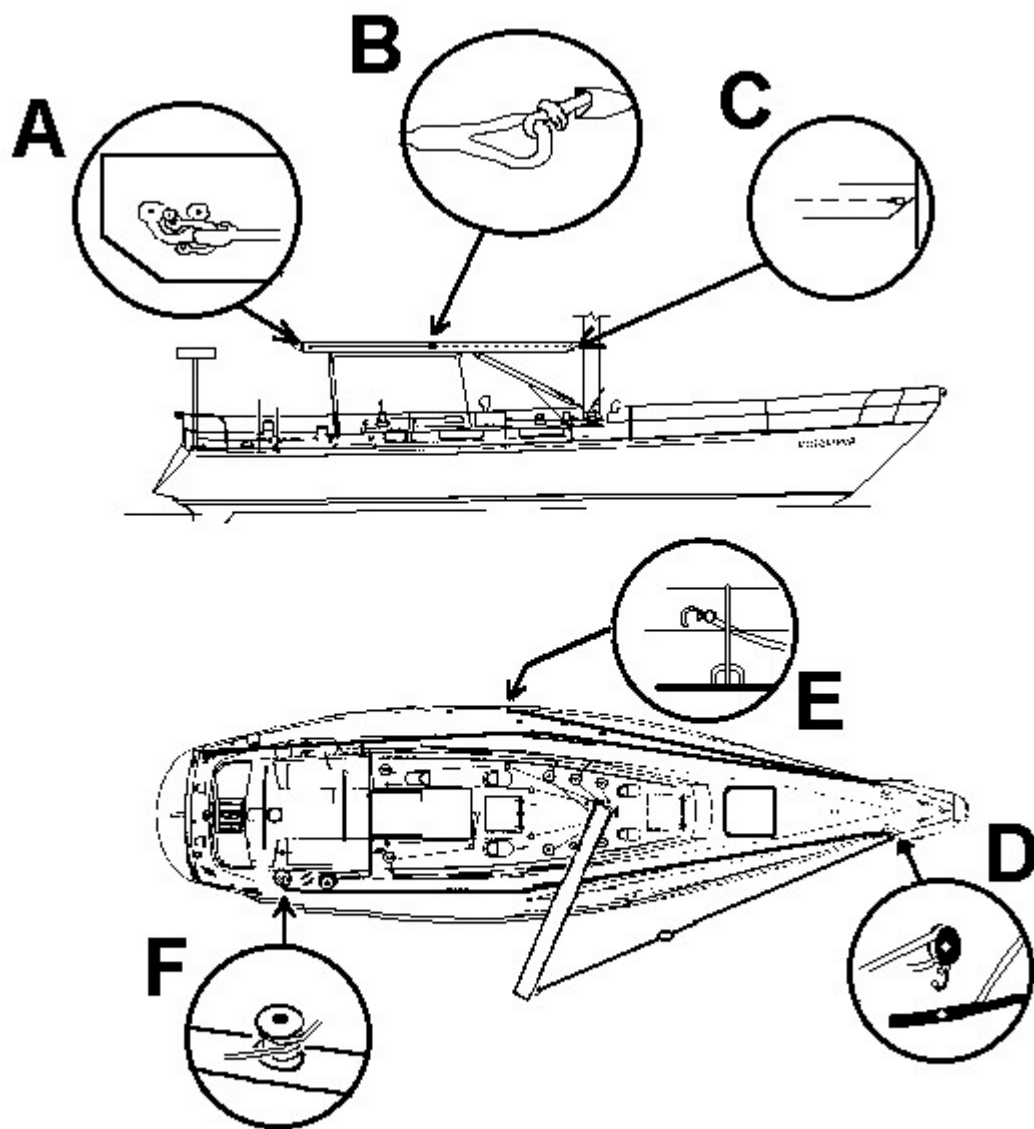
See section 3-5.5.10, REEFING THE MAINSAIL.

### 1-6 SAILS.

The mainsail is "cut" to the maximum sail area allowed by the mast "P" dimension, (hoist), of 50.58 ft and the "E" dimension (boom), of 16 ft. A new mainsail has been introduced in 2000 for NA 5 thru NA 8, and NA 13 thru NA 20.

The Jibs/Genoas are loose-footed headsails attached to the headstay, hoisted on aramid/rope halyards, and controlled with sheets led to adjustable sheet lead blocks on a pair of tracks inboard of the toe rail on each side of the deck, then led to the primary winch in the cockpit. When sailing on a reach the sheet may be led outside the life lines to the toe rail, through a snatch block, and aft.

Figure 1-13 Preventer System



Spinnakers are symmetrical full-bellied sails of nylon fabric hoisted on Dacron halyards.

The leeward clew is controlled with a sheet led to the Spreacher block at the aft pulpit, then to a secondary winch in the cockpit. A small snatch block on the toe rail may also be used to prevent the spinnaker sheet from chaffing on the boom while on a run. The windward clew is controlled with a ½" spectra afterguy snap shackled to the sail, led through the end of the spinnaker pole, and back to a snatch block located at the widest part of the deck, then to the primary cockpit winch. The spinnaker pole is attached to the mast on an adjustable track. A topping lift holds up the outer end of the pole. The outboard end is controlled with a foreguy that leads down to a block on the foredeck, then aft to a cleat on the aft side of the cabin. See Figure 1-14, Sail Plan.

#### 1-6.1 MAINSAIL

The new mainsail (year 2000) for NA 5 thru NA 8 and NA 13 thru NA 20 is made of 9 oz. cloth with a total sail area of 406 square feet. The first reef can reduce sail area to 302 square feet (75%) and the second reef to 205 square feet (50%). The mainsail is not an exact triangle.

The mainsail is constructed of multiple panels so that it form an airfoil. The curve of the airfoil is the camber of the sail. When air flows across it, lift is created. Lift is the aerodynamic principal that makes it possible for the sail to propel the boat, even in a vector toward the wind. This is a key concept in sailing. The extra material along the trailing edge (leech) of the sail that extends beyond a straight line between the head and clew of the sail is called "roach" and serves to slightly increases the sail area. The mainsail has four battens to support the roach of the sail.

The top two are "full length battens", (battens extend from luff to leech, support the roach, and give the draft definition. The luff end of the batten is supported by a batten car. The two lower battens support only the aft portion of the

sail. The edges of the sail are seamed with extra layers of material to prevent chafe. This is called tabling. The aft ends of the batten pocket have a velcro closure to retain the batten. The sail is loose footed, and is attached to the boom only at the tack and clew.

The three corners of the sail (head, tack and clew) are heavily reinforced with extra fabric to withstand strain. Once the mainsail has been "bent on" it is normally left attached to the mast and flaked on the boom. It is secured with sail ties, and covered with an acrylic sail cover to prevent ultra violet light deterioration. The mainsail is fitted with a cunningham cringle to help control draft. Foot tension is controlled with an internal outhaul system. See Figure 1-15, Sail Nomenclature.

#### 1-6.2 JIBS/GENOAS

A Genoa is a headsail that overlaps the mast, (and the mainsail) providing greater power. A jib is the forward most headsail. Its maximum size will fill the fore triangle (area forward of the mast) or can be any portion thereof.

The Navy 44 is provided with two (2) Dacron Genoa headsails. The #1 Genoa is the larger (819 sq. ft.), filling approximately 150% of the fore triangle, and is the lighter weight cloth (6.3 oz. per sq yd).

The #2 Genoa fills approximately 130% of the fore triangle and has been designed with a high clew to allow for better visibility of the forward leeward bow area. The Genoa sheets are led outboard of the shrouds to fair leads on the aft headsail tracks.

The #3 jib is approximately 100% of the fore triangle while the #4 is approximately 85%. For beating or close reaching, the jib sheets are lead outside of the forward lower shrouds and inboard of both the upper shrouds and the aft lower shrouds to the forward headsail tracks. For reaching, the jib sheets may be led outside the lifelines to a snatch block on the toe rail.

Figure 1-14 Sail Plan

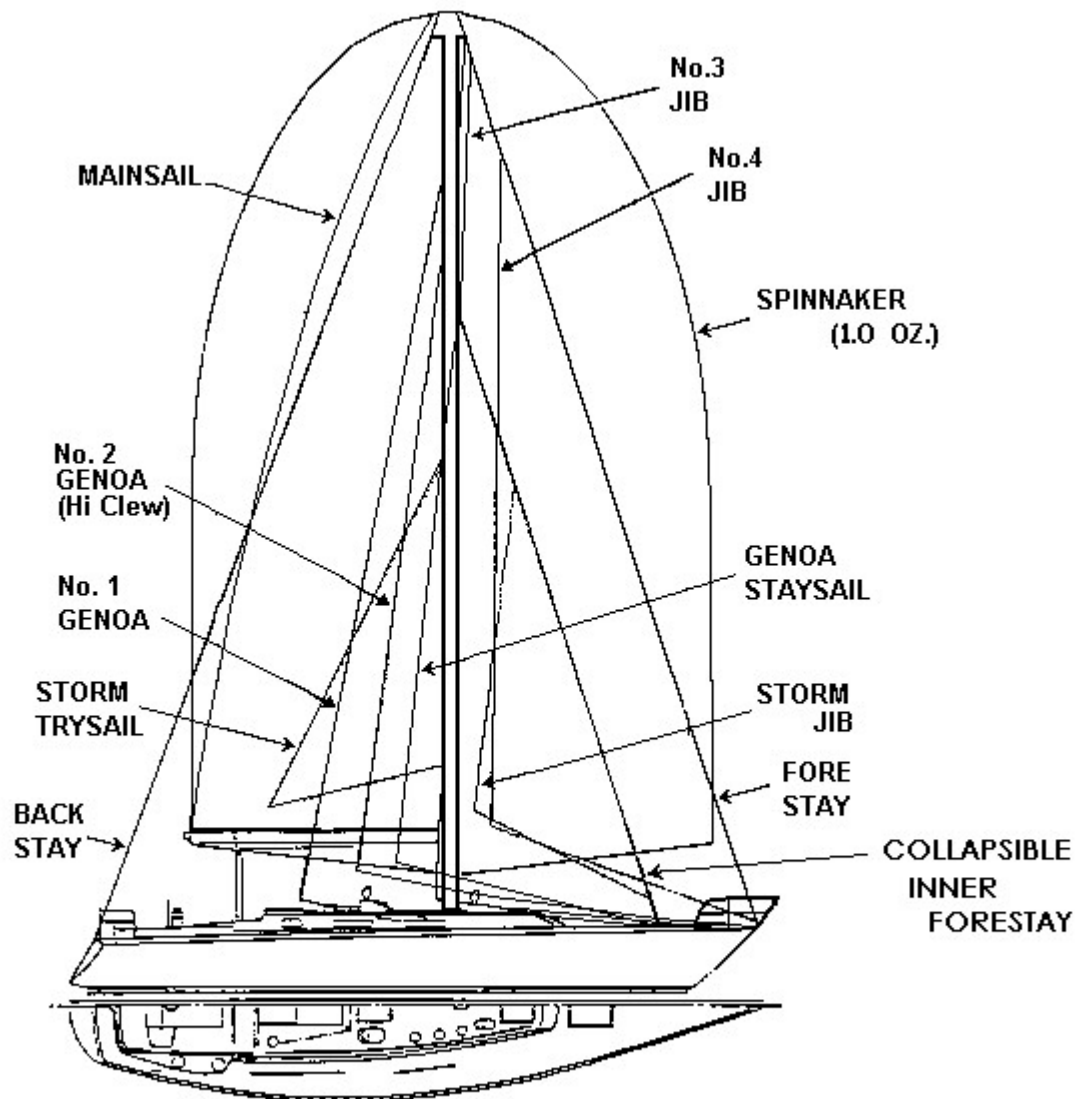
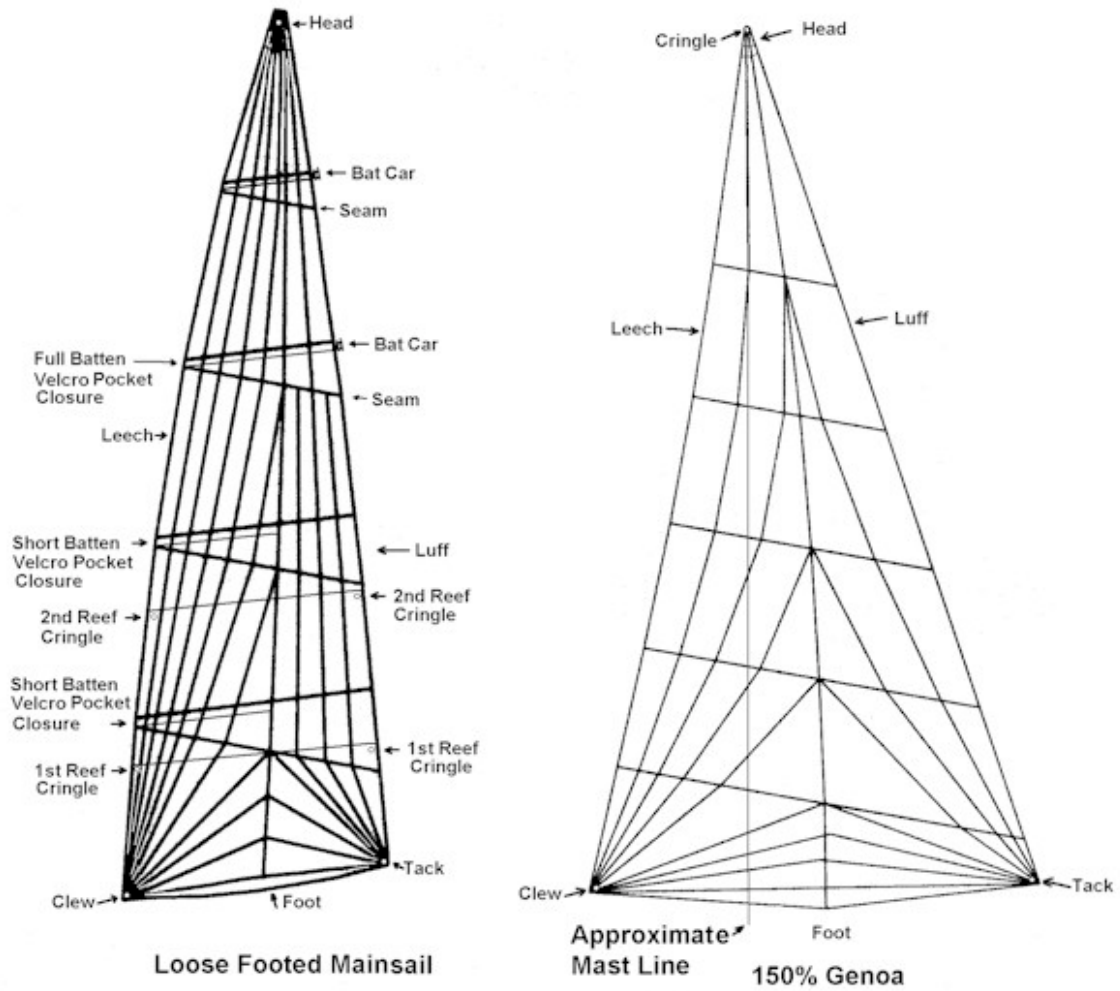




Figure 1-15 Sail Nomenclature



The tail of the jib sheet should be led to the foot block on the toe rail to control the unsupported length of this portion of the jib sheet and prevent wind override.

Jibs/Genoas are attached to the rod headstay either with #3 piston hanks, (NA1 thru NA8, NA13 thru NA20), or with luff tape sewn on the sail to a slotted headstay, (NA9 thru NA12). The fairlead cars for the piston hanked headsails are either pull-pin or screw-pin controlled to their respective tracks. Luff groove headsails sheets are led to a Harken system. A control line is used to move the car forward. The pull on the sheet caused by wind pressure in the sail moves the car aft. Sail shape can be changed by adjusting sheet lead position, halyard tension, and backstay tension. See Figure 1-15.

See Chapter 3, Table 3-1 Sail Management, for sail selection for a given wind condition, and recommended starting sheet lead positions.

### 1-6.3 SPINNAKER

The spinnaker is used for sailing "off the wind" e.g. with the wind on or abaft the beam. Spinnakers are made of nylon cloth of a weight to match the wind condition. The standard spinnaker for the Navy 44 is 1.0 oz cloth. The 1.0 oz spinnaker included in the Navy 44 sail plan is used for winds up to 15 knots apparent wind.

### 1-6.4 STORM SAILS

Two storm sails are provided on the Navy 44, a storm jib and a storm trysail. These are small sails, made of heavy Dacron, and are reinforced to withstand high winds. The storm jib is hanked to the collapsible inner forestay. The sheets lead outside the lifelines to a snatch block on the toe rail, one (1) hole aft of the midship lifeline stanchion. The running backstays must be used with the storm jib.

The storm trysail is used in lieu of the mainsail and is hoisted on its own track on the port, aft sector of the mast. The tack of the sail has a Dacron line spliced through the cringle. This pennant allows the sail to be hoisted above

the boom and secured with the tack above the gooseneck. The permanently attached sheets lead to the Spreacher blocks. Both sheets are set at the same time to make the storm trysail self-tending. See Chapter 6, heavy weather sailing for a more complete discussion on storm sails.

## 1- 7 SYSTEMS

Systems on the Navy 44 listed herein are:

Steering.	Bilge
Propulsion.	Alarms.
Electrical.	Galley
Electronic.	MSD (sanitation)
Sea Water.	

### 1-7.1 THE STEERING SYSTEM

The Navy 44 has a 48-inch Edson 644S stainless steel wheel mounted on an Edson Pedestal Steering Gear Model 400S, Size 6-211. Internally, the pedestal mounted gears drive a bronze, 5/8-inch pitch, sprocket and stainless steel roller chain attached to 1/4-inch stainless steel wire rope through 6" idler sheave that activate an Edson Model 777, 12-inch Radial Drive fitted to the rudder stock. The wire tension is adjustable and is led to the quadrant through 6-inch idler sheaves. Affixed to the rudder stock is a stop arm that limits the maximum rudder angle.

The rudder stock is 2-1/2 inch diameter Aquamet 22 shafting that extends up from the rudder through the hull to the main deck aft. The rudder stuffing box is an Edson Fig. 697B with a delrin bearing inserted and bored out. The base of the rudder stock rides on a bearing bolted to the bottom of the fiberglass skeg. A bronze skeg tip is bolted to the bottom of the fiberglass skeg to provide streamlined water flow around the rudder. The top of the rudder stock rides in a delrin carried bearing, and extending through the afterdeck. The rudder stock is squared off to provide an attachment for the aluminum emergency tiller. A fiberglass cap protects the rudder stock during normal operations.

This cap must be removed to attach the

emergency tiller. The emergency tiller is stowed in the port lazarette. See Figure 1-16, Steering System, Figure 1-17, Steering Side View.

## 1-7.2 THE PROPULSION SYSTEM.

The primary means of propulsion is sail power. Auxiliary power is provided by a diesel engine and associated systems. This section describes the engine and related sub-components:

- Auxiliary Diesel Engine
- Fuel System
- Cooling System
- Exhaust System
- Engine Controls
- Propulsion Shafting
- Fire Detection System

### 1-7.2.1 AUXILIARY DIESEL ENGINE

Auxiliary propulsion on the Navy 44 is a diesel engine located below the companionway to the cabin. The engine is a Westerbeke Model W-40-NA. It produces rated power of 37 H.P. at 3,000 rpm. The 4-cylinder diesel engine has a total displacement of 107.4 cubic inches with a cylinder bore diameter of 3.25 inches and piston stroke of 3.5 inches.

The engine drives a Hurth Model HBW 150-2R, 1. 88:1 Marine Gear mounted directly on the flywheel housing. The marine gear is activated by a hydraulic clutch that allows propeller rotation in a forward, neutral or reverse mode. The diesel engine also drives two 51 ampere, 12-volt dc alternators. The original refrigeration system has a York compressor with a multiple belt pulley on the forward end of the crankshaft. This system is being replaced with a 12-volt dc charging system on NA 2, NA 8, and NA 15 thru NA 20.

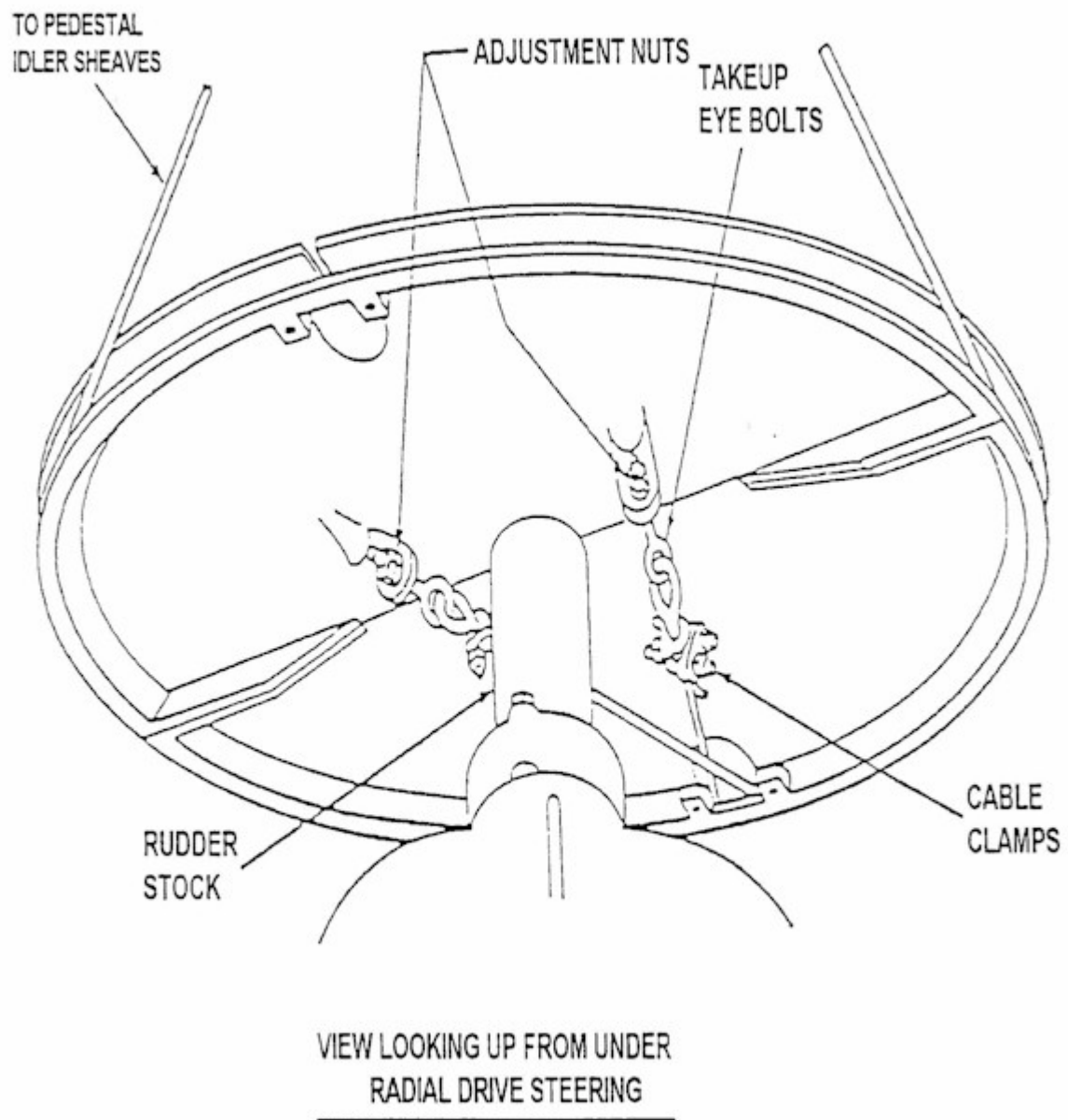
Figure 1-18, Engine (Side Views), and  
Figure 1-19, Engine (Front and Top Views).

### 1-7.2.2 FUEL SYSTEM

The fuel system is a closed loop return system, intended for #2 diesel fuel supplied from a 50-gallon aluminum tank, located amidships under the cabin sole. Because of the asymmetric design, fuel remaining is not a linear function of measurement up from the bottom of the tank. There are approximately 45 gals of useable fuel. For dipstick equivalents and to interpret readings on the gauge, see Figure 1-20, Fuel Gauge Readings.

The tank has two 6-inch diameter inspection plates for cleaning. One plate is fitted with a Rochester Gauge Inc., Type 8600 spiral action float level indicator. The tank fill line is 1-1/2 inch I.D. Shields hose connected to a Perko 520, 1-1/2 inch, chrome plated bronze fill plate marked "DIESEL" on deck amidships to port. Venting is via a 3/8-inch soft copper tubing that rises to the level of the lower lifeline inside of the lifeline stanchion to the left of the companionway. Packless Anderson bronze shut-off valves are fitted at tank connections for supply and return lines. Fuel supply and return lines are Aeroquip flexible hoses, equipped with shut-off valves located under the midships cabin floorboard deckplate. Closing the valve will cut off fuel to the engine. A primary Racor filter, 460RP30 mounted outside of the aft engine compartment bulkhead port side, has an electrical water detector alarm mounted on the electrical switchboard panel which will sound a buzzer upon electrical power-up, (approximately 5 seconds), and when water is detected in the fuel. The 10-micron filter should trap sediment in the element cartridge upstream of the sediment bowl. If sediment is ever observed in the bowl, the filter element should be changed. The sediment bowl incorporates a contaminant drain petcock. The Racor filter then passes fuel to the lift pump then to the engine mounted

Figure 1-16 Steering System



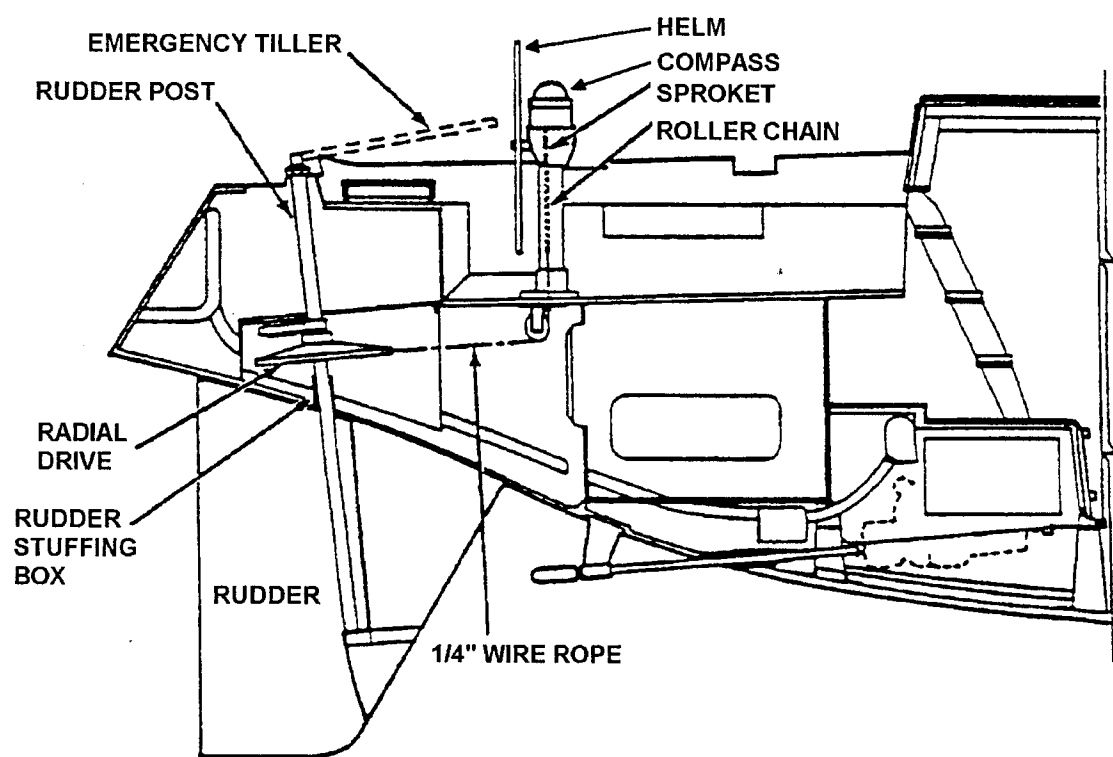
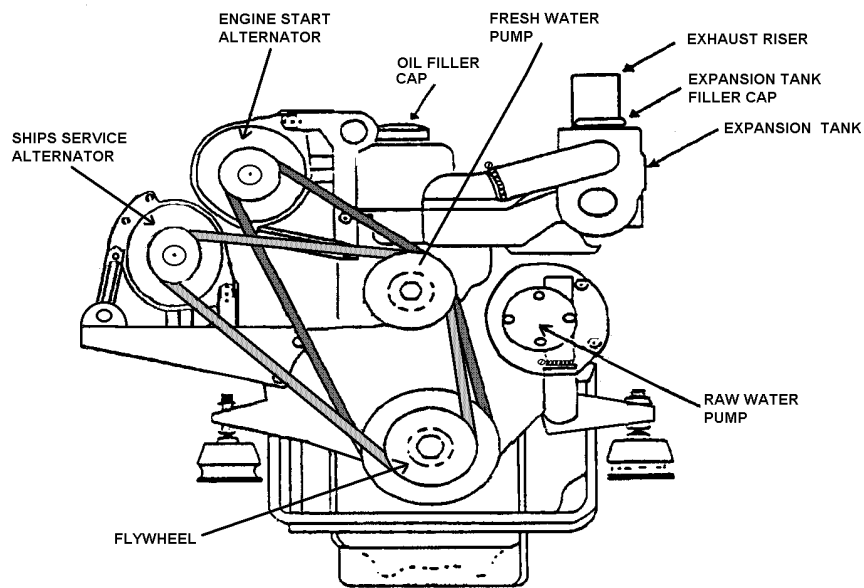
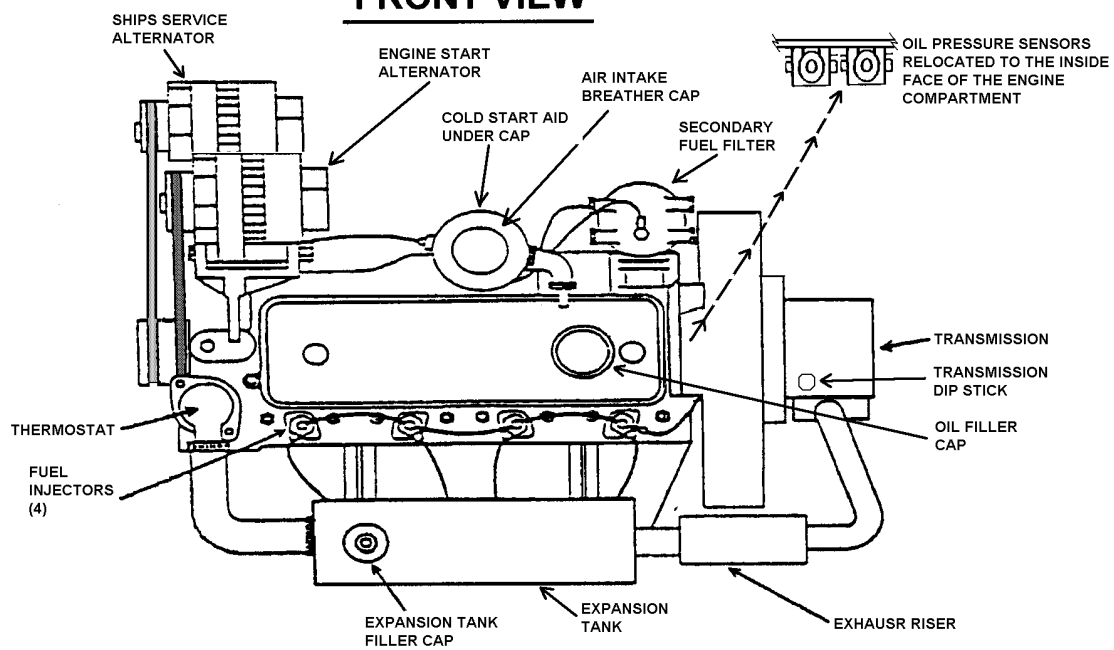


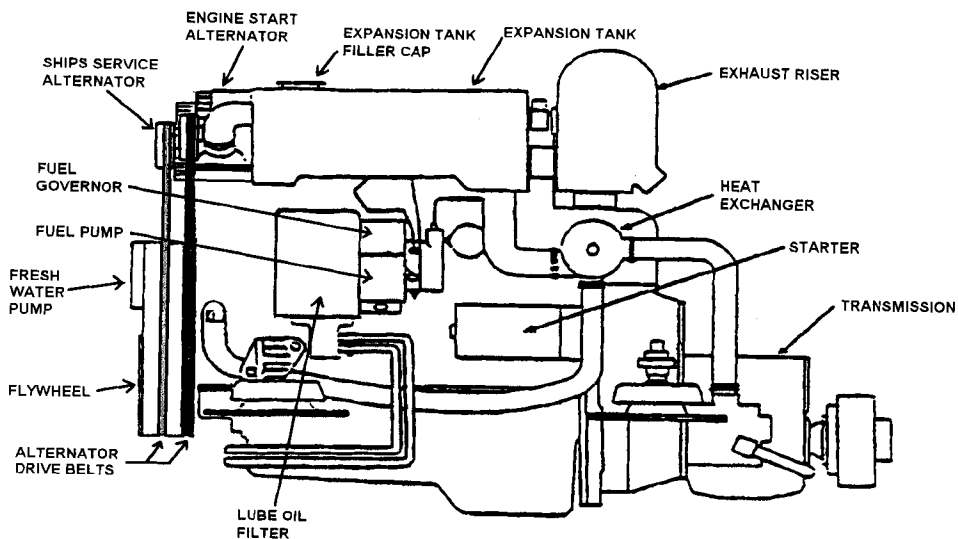
Figure 1-17. Steering (Side View)



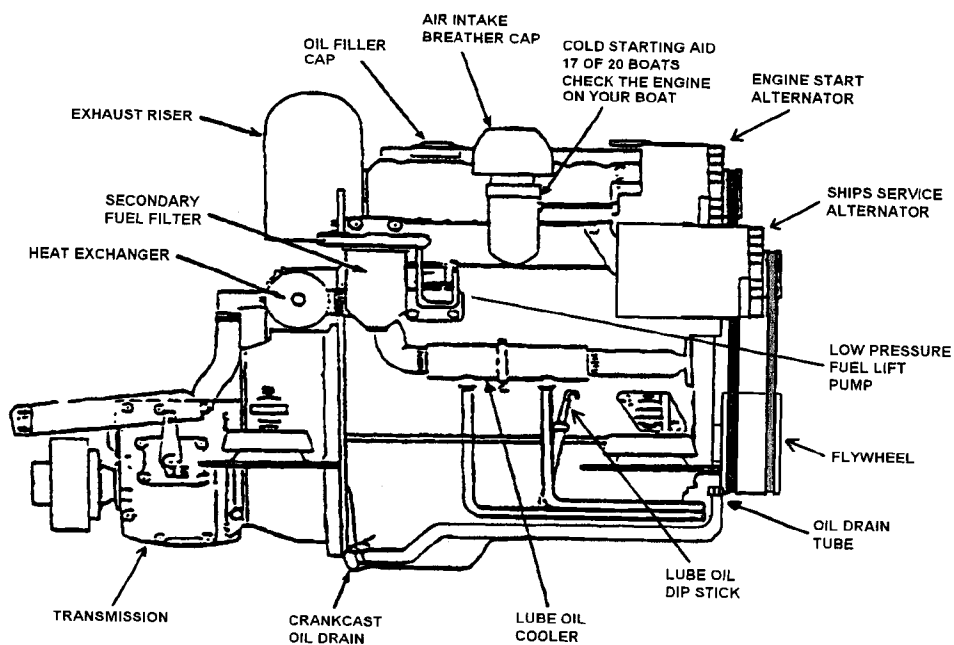
**FRONT VIEW**



**TOP VIEW**



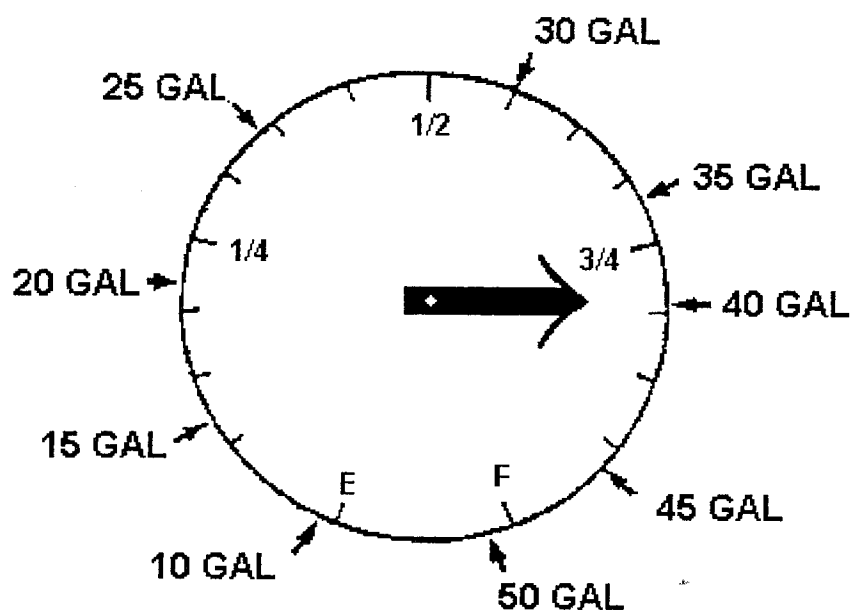
### **PORT VIEW**



### **STARBOARD VIEW**

Figure 1-18. Engine Side View

## FUEL QUANTITY GAUGE



### DIP STICK READINGS

<u>GALLONS</u>	<u>INCHES UP FROM BOTTOM</u>
45	13 1/2
40	12 1/4
35	10 3/4
30	9 3/4
25	8 1/2
20	7
15	5 3/4
10	4 1/4
5	3

Figure 1-20. Fuel Gauge Readings



secondary filter. After the secondary filter, low-pressure fuel flows to the injector pump which puts the fuel under extremely high pressure. More fuel than the engine can use is provided to the injectors. Surplus fuel is returned to the tank. See Figure 1-21, Racor Filter.

#### 1-7.2.3 COOLING SYSTEM

Raw water enters the boat through a seacock located at the aft portion of the engine compartment into a glass enclosed Perko strainer. The strainer has a removable top with butterfly nuts to access the strainer for cleaning. The raw water is then routed to the water pump mounted on the front of the engine. Cooling water under pressure is then routed to the heat exchanger. A captive anti freeze system cools the auxiliary diesel engine. Raw seawater is used to cool the anti freeze through a heat exchanger. In the older system water is picked off to the refrigeration system condenser. Raw water is then routed to the oil cooler. A sacrificial anode in the oil cooler prevents salt water corrosion. Raw water is then routed out of the boat through the exhaust system. See Figure 1-22, Raw Water Strainer, and Figure 1-23, Cooling System.

#### 1-7.2.4 EXHAUST SYSTEM

The exhaust system for the diesel engine consists of a water jacket cooled exhaust riser, with raw sea water anti-siphon, and a muffler with a drain plug is located under the after deck-plate. A 1-7/8 inch I.D. nautical rubber exhaust hose leads to a Hydro Hush exhaust silencer. A 2 inch I.D. Nautical Rubber No. 252 hose with a loop above the waterline leads aft to an above water transom discharge. See Figure 1-24, Exhaust System.

#### 1-7.2.5 ENGINE CONTROL/INSTRUMENT PANEL

Engine controls and instrumentation are located at the after end of the cockpit to starboard of the helmsman's seat. A plexiglass door protects this panel. The Instrument panel is

equipped with lights for night operations. Lighting is activated through a switch on the Electrical Switchboard. The Panel includes:

- Preheat Button
- Start Button
- Tachometer/ Engine Hour Meter
- Water Temperature
- Oil Pressure Gauge
- Voltmeter
- Ammeter (reads Start Battery Charging)

See Figure 1-25, Engine Instrument Panel.

#### 1-7.2.5.1 PRE-HEAT and START BUTTONS.

These two buttons are wired in series. The pre-heat button must be depressed to activate the start button. The preheat button, lower left on the panel is pushed in to activate a glow plug in the engine for cold engine starting. There are two locations for the glow plug. In the intake manifold just below the oil breather cap for all boats except NA-15, NA-17 and NA-20. These boats have a glow plug for each cylinder located on the port side of the engine head just below the injectors. See Figure 1-26, Glow Plug. The second button is the start button. After pre-heating the engine, pushing both buttons simultaneously will crank the engine.

There is an emergency power panel on the outside of the starboard corner of the engine compartment. One item is the Emergency battery power button which when depressed will parallel all the batteries so that a start can be attempted with low engine battery power. The other is the Emergency Start button. There is an Alternator Failure switch that makes it possible to provide Ships Service to each bank from the good alternator in the event of an alternator failure.

#### 1-7.2.5.2 TACHOMETER

The tachometer is located in the upper left hand corner of the panel. It measures engine revolutions per minute (RPM) on an analog display. The signal is generated by the engine start alternator and is functional only when the

Figure 1-21 Racor Filter

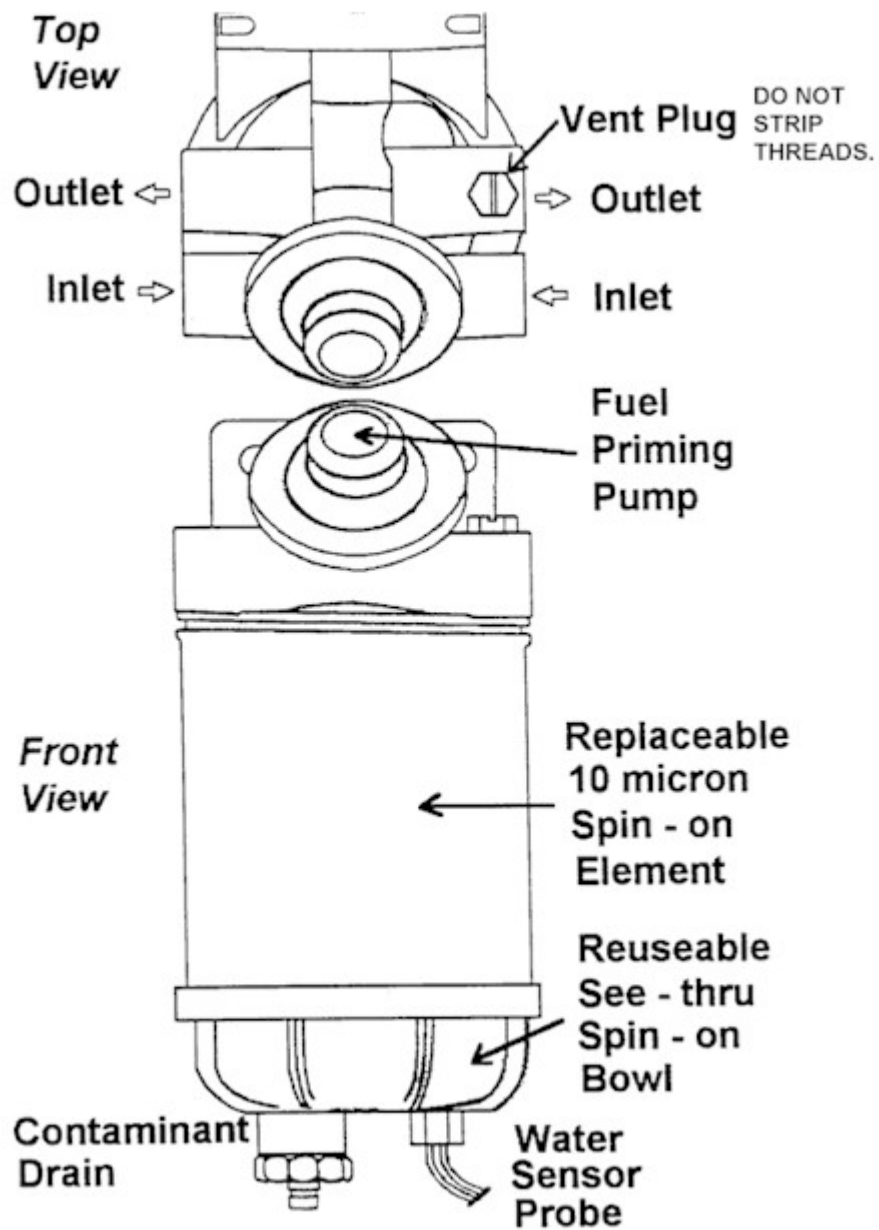


Figure 1-22 Raw Water Strainer

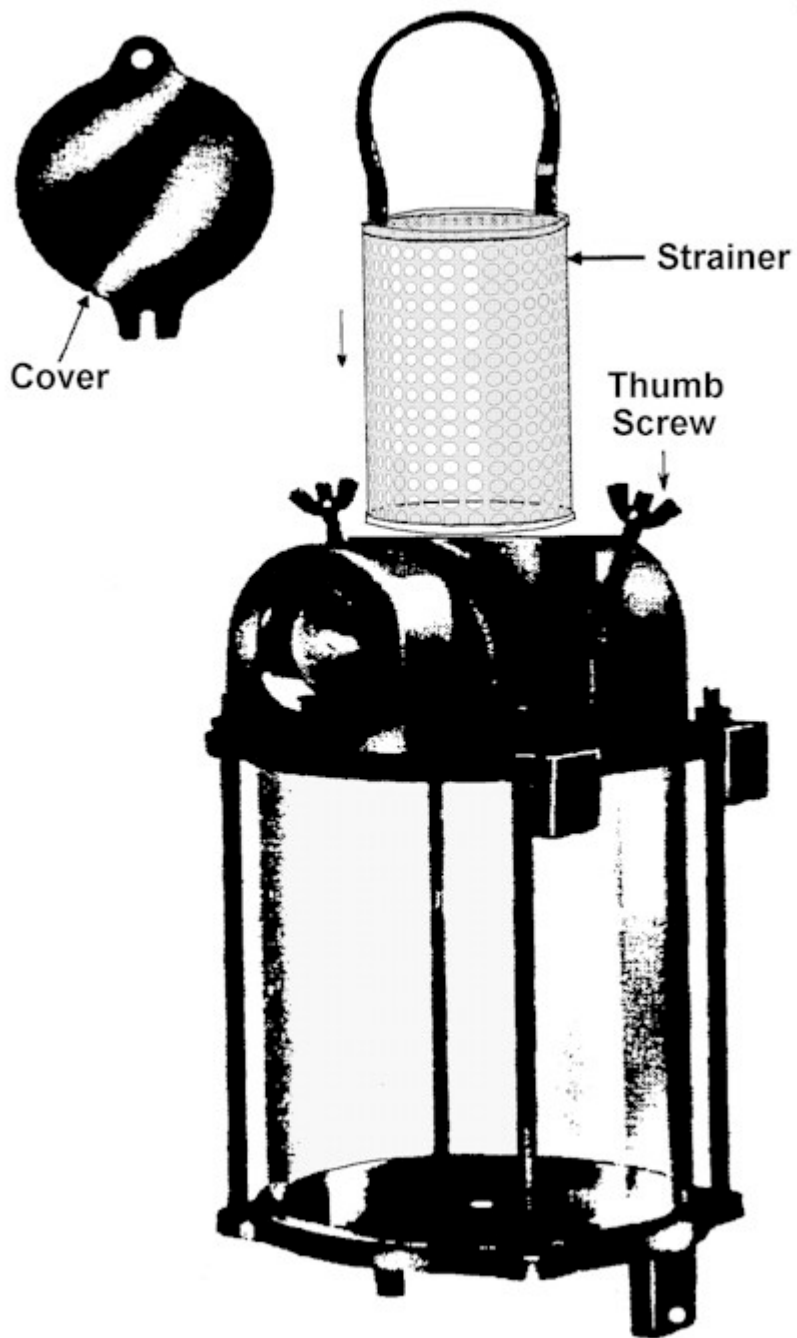


Figure 1-23 Cooling System

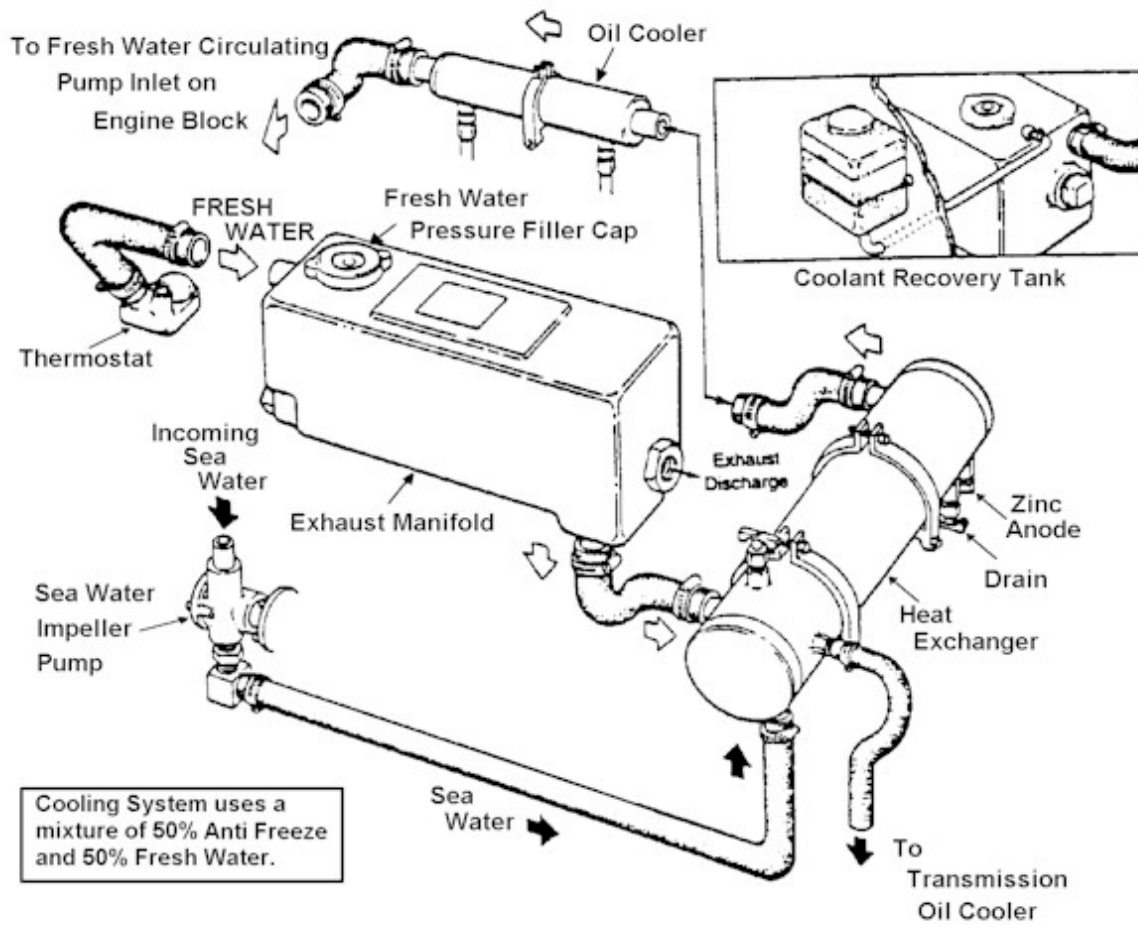


Figure 1-24 Exhaust System

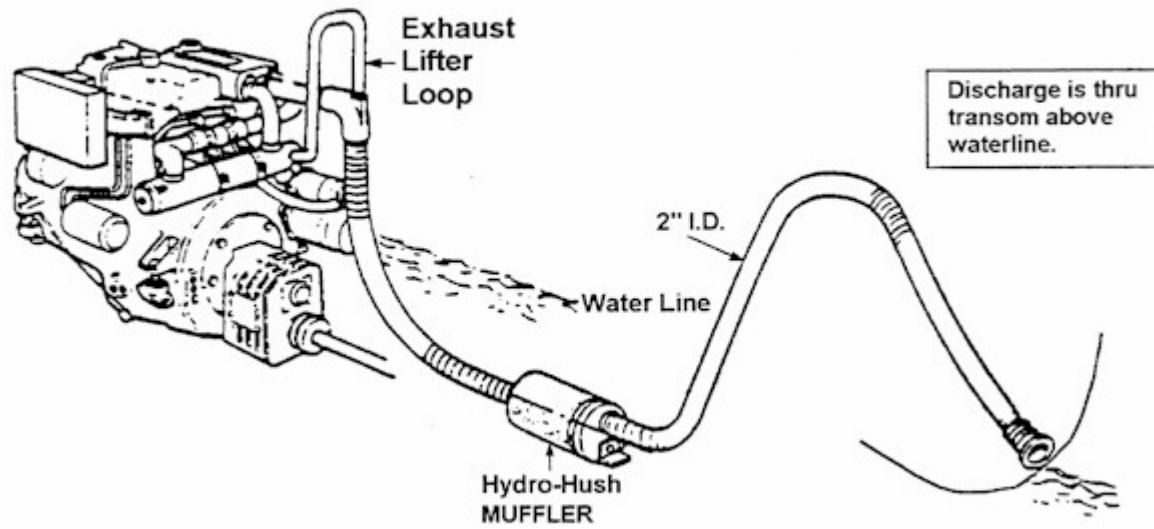
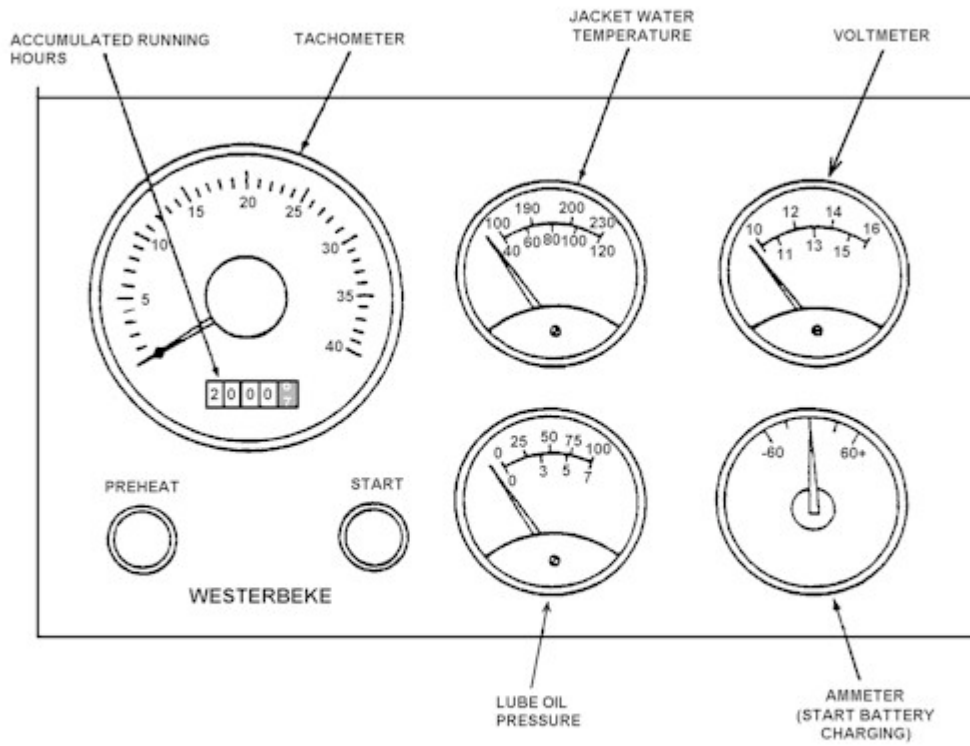
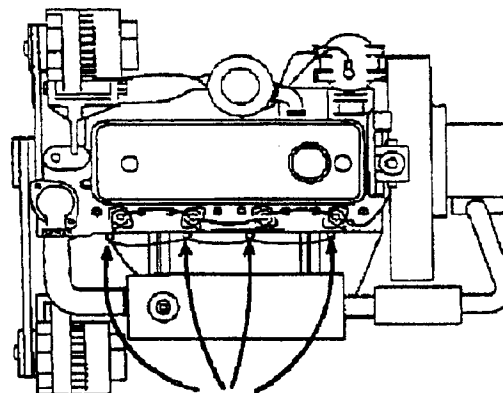
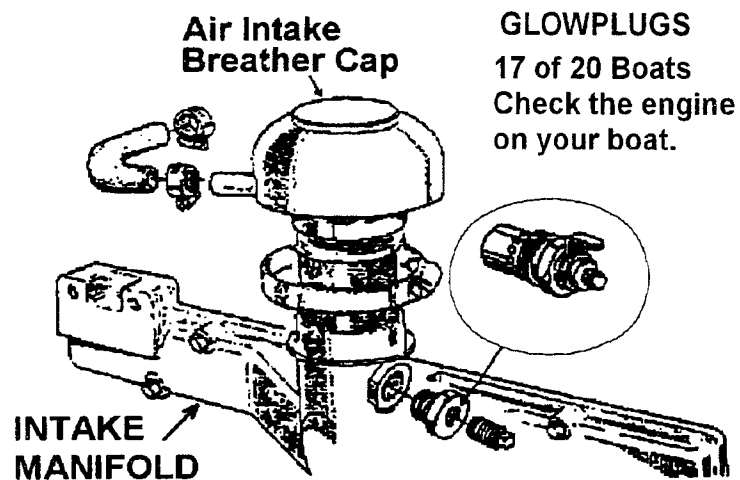


Figure 1-25 Engine Instruments





GLOWPLUGS  
3 BOATS HAVE A  
GLOWPLUG IN EACH  
CYLINDER

Figure 1-26. Glow Plugs

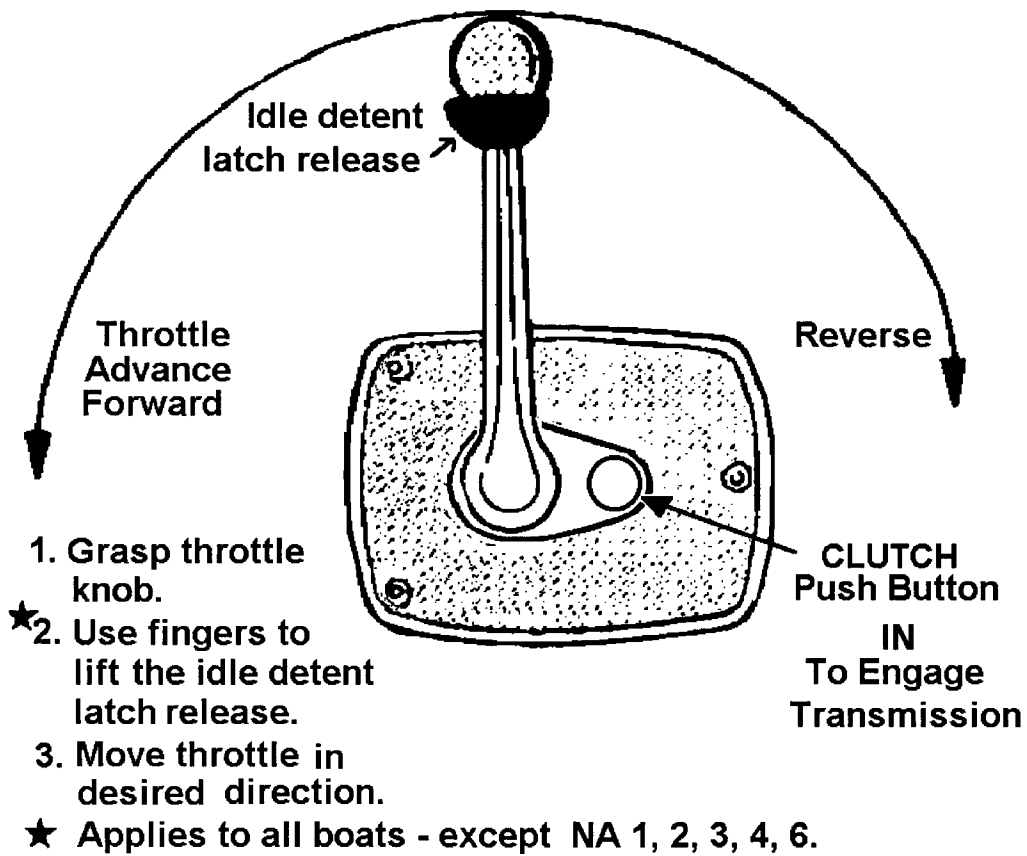


Figure 1-27. Throttle



engine oil pressure sensing switch detects oil pressure equivalent to that of a running engine. This normally occurs at about 1500 RPM. A digital window in the tachometer displays Engine Hours in hours and tenths.

#### 1-7.2.5.3 WATER TEMPERATURE

The water temperature gauge upper row, center, measures from 100 to 250 degrees Fahrenheit (40 to 120 degrees centigrade). A thermostat regulates engine temperature at 180 degrees Fahrenheit.

#### 1-7.2.5.4 OIL PRESSURE

The oil pressure gauge located in the lower row, center, registers from 0 to 100 psi. A cold engine can register as high as 75 psi while a warm engine can be as low as 15 psi without damage. Normal oil pressure should be between 30 and 60 psi.

#### 1-7.2.5.5 VOLTMETER

The voltmeter upper row right gauge, registers from 10 to 16 volts. An indication of 13.5 volts or higher is normal when the engine is running, because the Engine Alternator is charging the engine start battery.

#### 1-7.2.5.6 AMMETER

The ammeter, bottom right, measures rate of charging with the engine running. 30 amps is normal for a severely discharged battery. Amps will decrease to reach zero when the battery is fully charged.

#### 1-7.2.6 ENGINE CONTROLS.

Propulsion from the auxiliary diesel engine is controlled by a single-lever Morse MV control, mounted aft on the starboard side of the cockpit. The transmission is engaged by pushing IN on the clutch button adjacent to the throttle.

Engine throttle lever.

NA-1,2,3 4, and 6 are equipped with the old style throttle lever, (without idle detent latch release).

To move the engine out of the idle range, just move the throttle forward or backward to increase engine RPM.

#### ALL OTHER NA 44's.

To move the throttle out of the idle position, the throttle must be unlocked by pulling up on the idle detent latch release at the base of the throttle knob. The throttle lever can then be rotated forward to advance engine speed and increases thrust in a forward direction. Rearward movement of the throttle will increase engine speed and propulsion to the rear. Engaging the transmission at too high an RPM causes damage to the internal gears and will lead to transmission failure. See Figure 1-27, Throttle Control.

#### 1-7.2.6.1 ENGINE SHUTDOWN T- HANDLE.

The ENGINE SHUTDOWN T-handle is located on the forward lower side of the helmsman's seat to starboard. Pulling UP on the T-handle shuts off fuel to the engine. The T-handle must be returned to its normal position, (pushed DOWN), for subsequent starts. If the engine does not start, check this first.

#### 1-7.2.7 PROPULSION SHAFTING AND PROPELLER

The propulsion shafting is 1-1/4 inch O.D. Aquamet 22 and is attached to the marine gear with a Federal Model 43A flexible coupling. The stern tube is a 2-1/4 inch O.D. by 1-1/2 inch I.D. fiberglass tube molded onto the hull.

The inboard end of the stern tube is fitted with a Spartan No. B164 Rubber Neck stuffing box. The outboard end of the shafting is supported by a cast manganese bronze strut, housing a 1-3/4- inch O.D. by 5-inch Cutlass bearing. The shaft is fitted with a streamlined zinc anode collar forward of the shaft strut. The Navy 44 is equipped with a Max Prop, 19 inch diameter by 18degree pitch, right hand, feathering propeller. This drives the Navy 44 at approximately 6 knots in calm seas.

The entire propulsion train alignment, from the engine mounts to the propeller, is skewed about 3 degrees to starboard (from center line) to allow the shaft to be drawn out without interference from the rudder skeg. See Figure 1-28, Stern Tube Details. See Chapter 3 for instructions for feathering and aligning the propeller.

#### 1-7.2.8 FIRE DETECTION AND EXTINGUISHING SYSTEM

The auxiliary diesel engine compartment is fitted with a Fireboy Model 15 C.G. automatic fire extinguishing system. An indicator light is located on the main electrical distribution panel. Excessive heat in the engine compartment will automatically activate the Fireboy system.

The Navy 44 is also equipped with one (1) 5-pound CO<sub>2</sub> and three (3) 2-1/2 pound dry chemical portable fire extinguishers. The 5-pound CO<sub>2</sub> fire extinguisher is located by the wet locker between the head and the navigation station seat. The 2 1/2 pound dry chemical fire extinguishers are bracket mounted inside the port hanging locker forward, above the galley sink, and inside the port cockpit locker.

#### 1-7.3 THE ELECTRICAL SYSTEM

The electrical system generates, stores, and distributes 12 volts D.C. power through the battery selector switches. The system consists of two engine-driven alternators, three battery banks, a power distribution switchboard, shore power connection and junction boxes. Electrical distribution is a two-wire, negative ground, unswitched return system.

A 120 VAC, 30 amp, 60 Hz shore power connection provides power to the 120 VAC converter/battery charger located in the head compartment under the sink. This provides power to the battery banks for charging while dockside. Power is also directed to the TECNAUTICS 12 vdc refrigeration system with a compressor located in the starboard side of the steerage compartment.

See Figure 1-29, Electrical System.

##### 1-7.3.1 ALTERNATORS

Two 12 volt d.c. 51 amp alternators are mounted on, and driven by, the auxiliary diesel engine. The alternator field circuits are energized by lubricating oil pressure switches located on the engine. Alternators are controlled by circuit breakers mounted on the switchboard panel. The alternators supply charging current to the battery banks and are capable of operating individually or in parallel.

In the event of an alternator failure a switching circuit will make electrical output from the remaining good alternator available to the other bank providing that the battery selector switches are energized. The emergency alternator switch is located on the stbd, outside face of the engine box.

##### 1-7.3.2 BATTERY BANKS

D.C. electric power is supplied from five batteries configured in three banks. Two banks are "house banks" labeled Ship Service (SS). Bank #1, (2 batteries in parallel), and Bank #2, (2 batteries in parallel). These two banks located beneath the navigation station seat are equipped with 12 volt D.C. 136 ampere hour Rolls, lead-acid type deep cycle marine batteries.

The third bank, located in the supply bin aft and to port of the engine compartment, is isolated for engine start. This battery is an M 27 high cranking amperage battery.

Both battery boxes are designed to keep the batteries from shifting in a 360 degree roll.

##### 1-7.3.3 BATTERY BANK SELECTOR SWITCHES

Two rotary master disconnect and transfer switches are located on the front face of the navigation station seat. The lower switch is the engine start switch. It has two positions, OFF with the switch pointing down, and ON with

Figure 1-28 Stern Tube

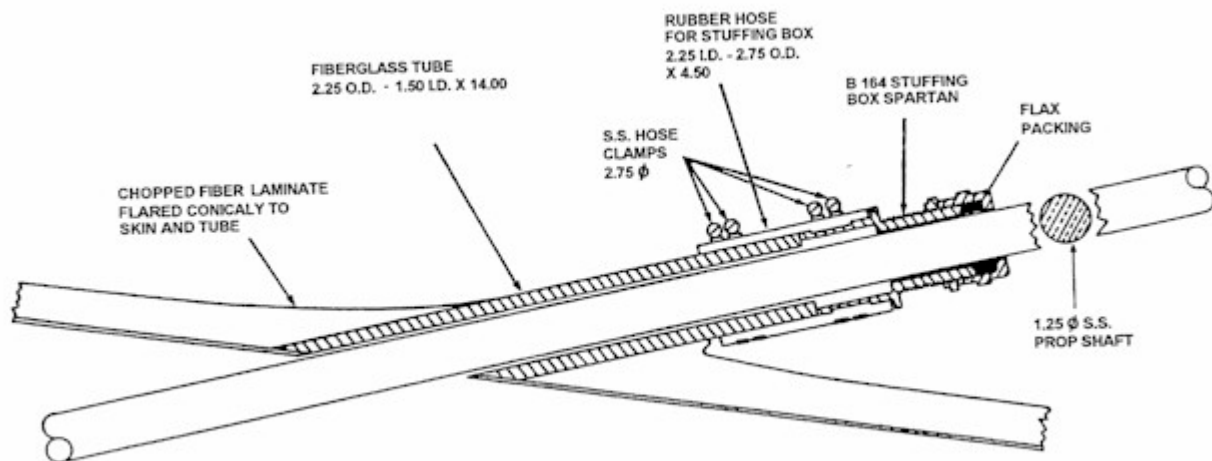
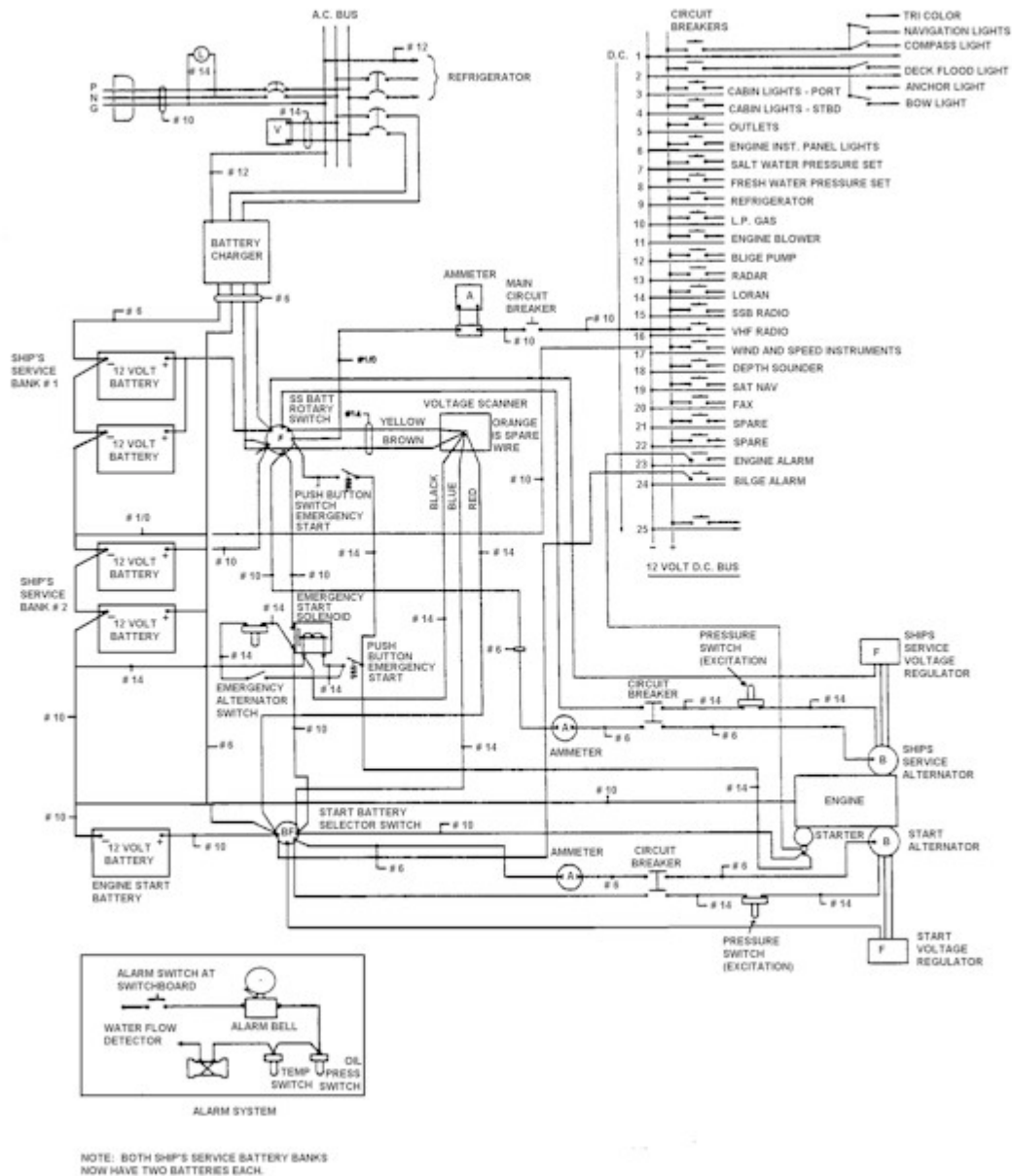


Figure 1-29 Electrical System



the switch pointing up. The upper switch is the Ships Service Selector Switch. This is a four-position switch. OFF is the down position. The position marked 1 selects SS Bank #1. BOTH, (switch pointing UP), selects both Ships Service banks. Position 2 selects SS Bank #2. See Figure 1-30, Ship's Batteries, and Figure 1-31, Rotary Switch Schematic.

#### 1-7.3.4 ELECTRICAL SWITCHBOARD

Internal electrical power distribution is controlled by the switchboard, which is located on the port bulkhead of the navigation station. The switchboard wiring compartment is divided into two sections separated by an insulating barrier. The top section is for D.C. power distribution. The bottom section is for A.C. shore power distribution. The switchboard is hinged to allow access to the back of the panel. A 1/4-inch clear plexiglass door covers the front. The switchboard has Heineman circuit breakers and Cole Hersee toggle switches. Every circuit on the Navy 44 is protected by these breakers and can be isolated for trouble-shooting or secured in case electrical fire.

A Racor /Fuel Filter Gauge, with an integral alarm, mounted on the switchboard, monitors water content in the fuel. See Figure 1-32, Electrical Switchboard Panel.

#### 1-7.3.5 SHORE POWER

A Hubbel 60 CM61 male inlet connection for 120 VAC, 60 Hz shore electric power is located on the inside of the port cockpit combing. Shore power is distributed to a Guest 2540, three-circuit, 40-ampere battery charger/converter, to the Gruner refrigeration system, and to outlet plugs. The shore power on-off switch is located on the A.C. section of the switchboard panel. See Figure 1-32.

#### 1-7.3.6 BONDING AND GROUNDING

The Navy 44 is constructed with bonding and grounding conductors incorporated integrally

under the hull's inner skin to provide a path for current flow from all metallic components and fittings to ground (sea water) via the propeller shafting strut and keel bolts. Radio frequency (RF) grounding is provided by a 24 foot long by 4 foot wide copper screen installed aft and bonded to the hull's inner skin. It is essential that the grounding system is always maintained intact to prevent electrical shock hazards, minimize corrosion due to electrolysis, and avoid electromagnetic interference. See Figure 1-33, Bonding and Grounding.

#### 1-7.3.7 LIGHTING

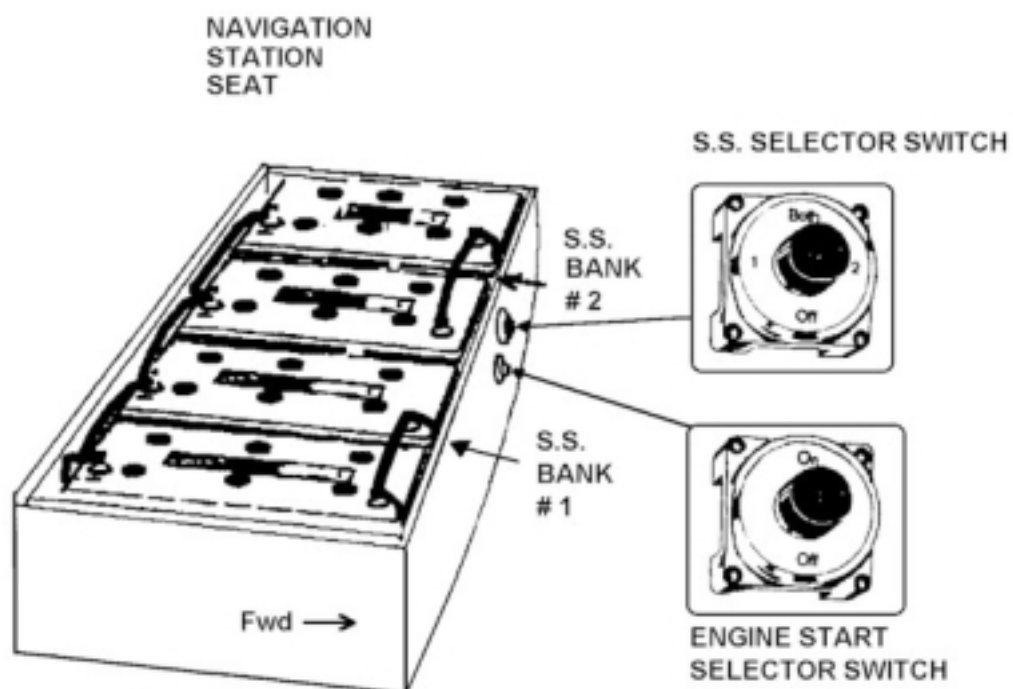
The Navy 44 is outfitted with a 12 volt D.C. lighting system throughout the boat for navigation, deck floodlight, and cabin lights. The cabin overhead of the Navy 44 is fitted with five (5) Night Vision red and white fluorescent fixtures and six (6) Night Vision red and white incandescent dome lights. Each light can be individually controlled with its own switch. The cabin light system is energized with switches for Cabin Lights Port, and Cabin Lights Stbd in the switchboard panel. See Figure 1-32.

#### 1-7.3.8 NAVIGATION LIGHTS

There are two sets of navigation lights:

- Aqua Signal Model AQS 3503302 combination red/green light on the bow pulpit is part of the "Nav Lo" set.
- Aqua Signal Model AQS 3502002 stern light on the stern pulpit, "Nav Lo" set.
- Aqua Signal Model AQS 3514912 combination Tricolor light and anchor light on top of the mast. The Tricolor, with red, green, white sectors, is designated "Nav Hi" on the switchboard panel. The "Nav Lights" circuit breaker must be selected to operate either set. The all around white anchor light, is located immediately beneath the Tricolor and is activated by a switch on the switchboard panel marked "anchor".

Figure 1-30. Ship's Batteries



Both Ship's Service Banks  
now have 2 batteries each.

Engine Start Battery has  
been moved to

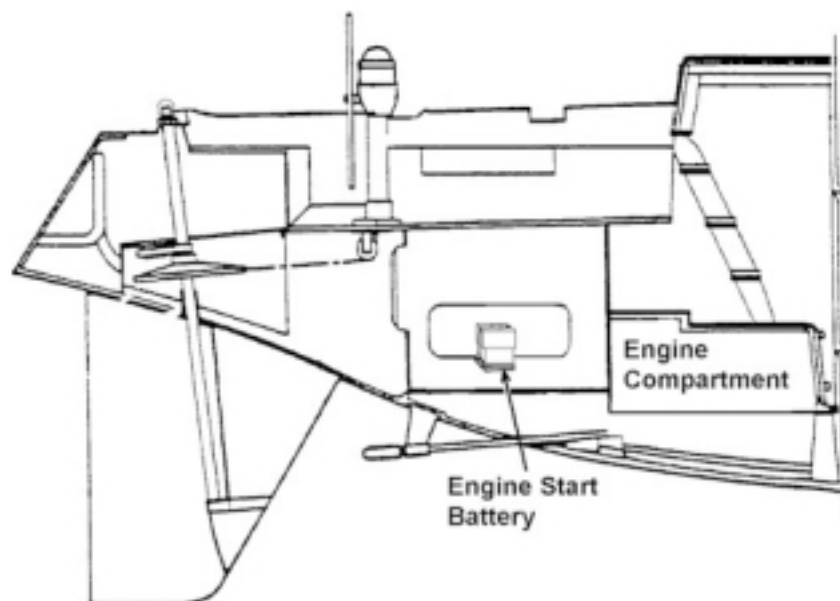


Figure 1-31. Rotary Switch Schematic

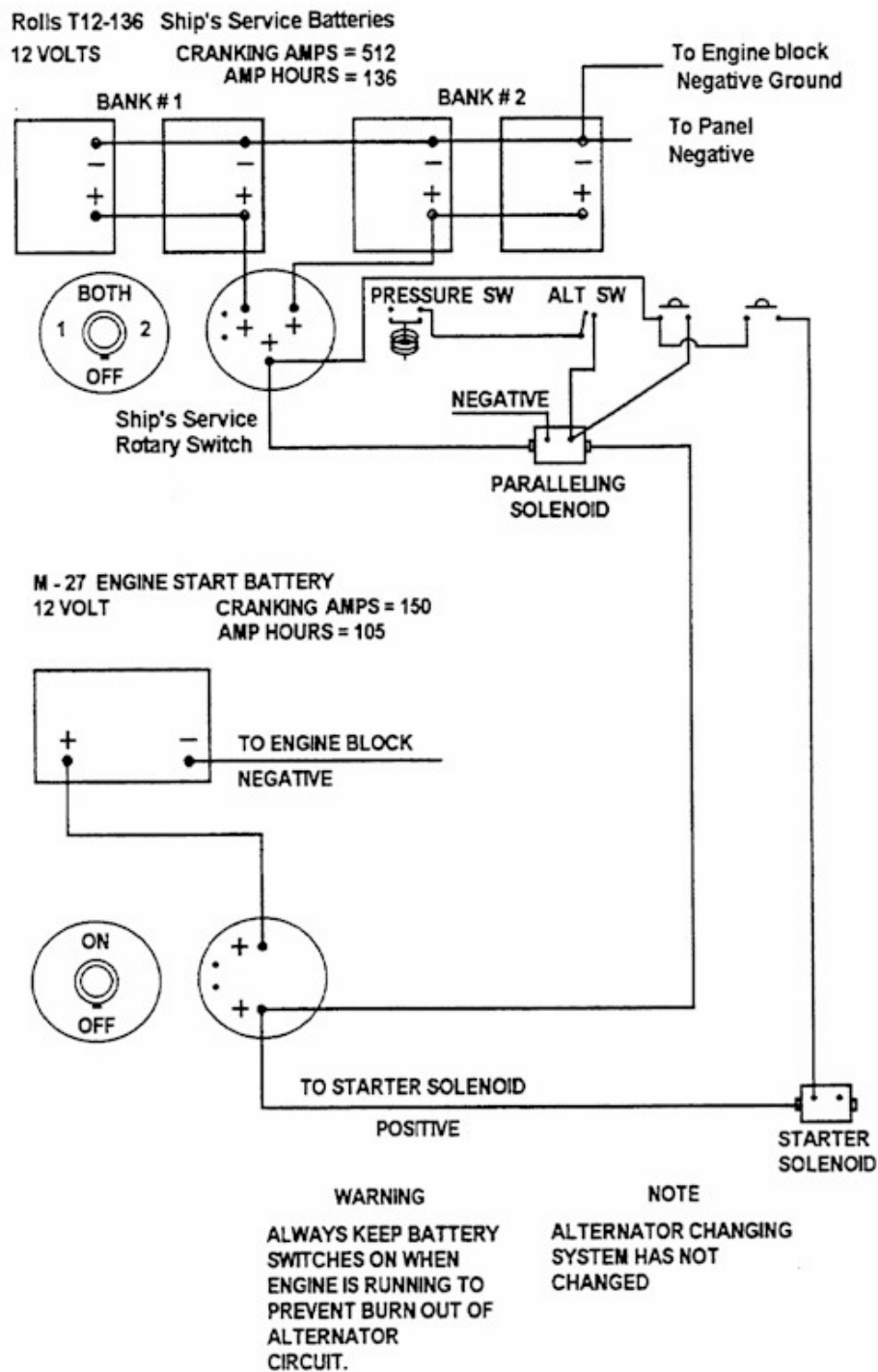
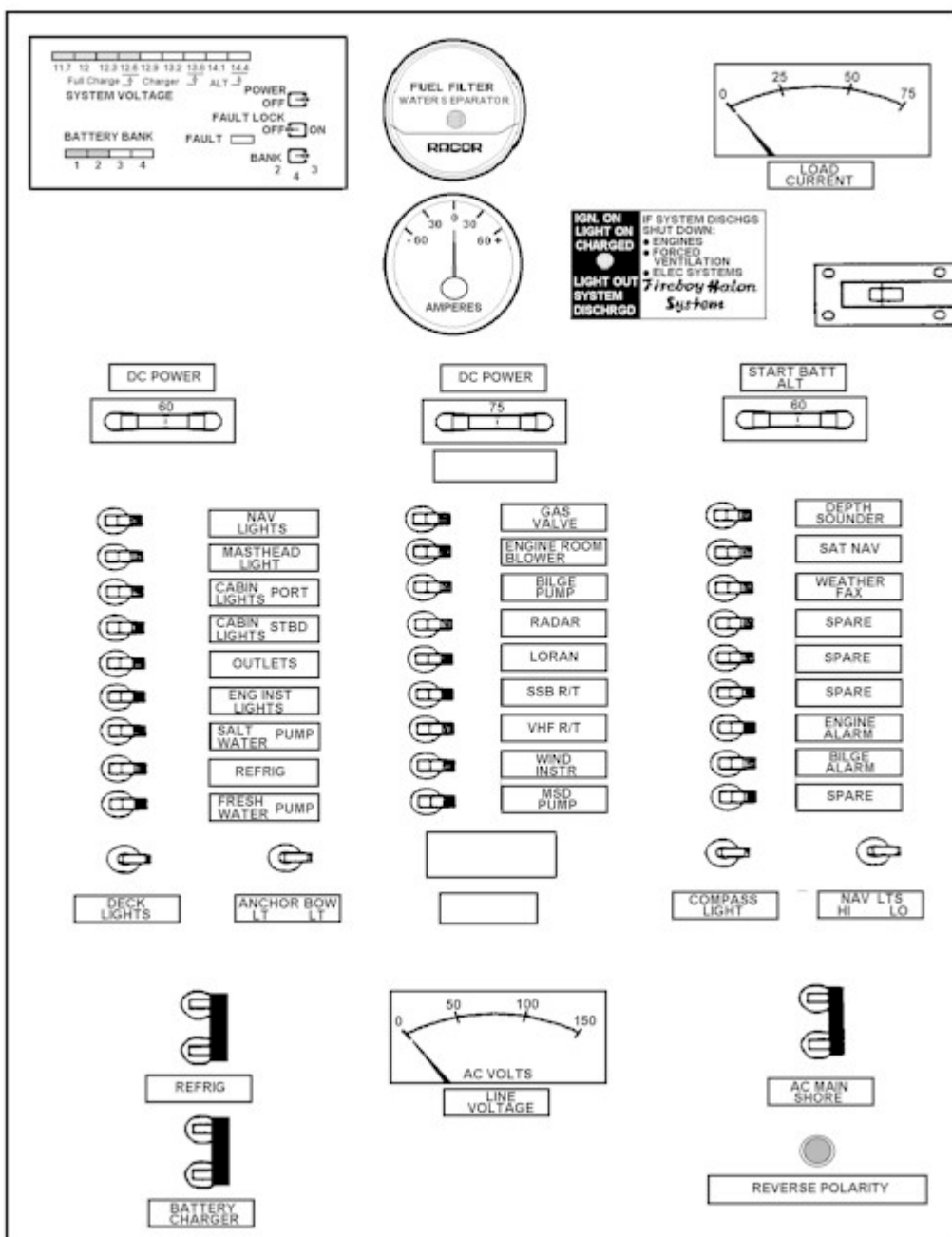


Figure 1-32. Switchboard





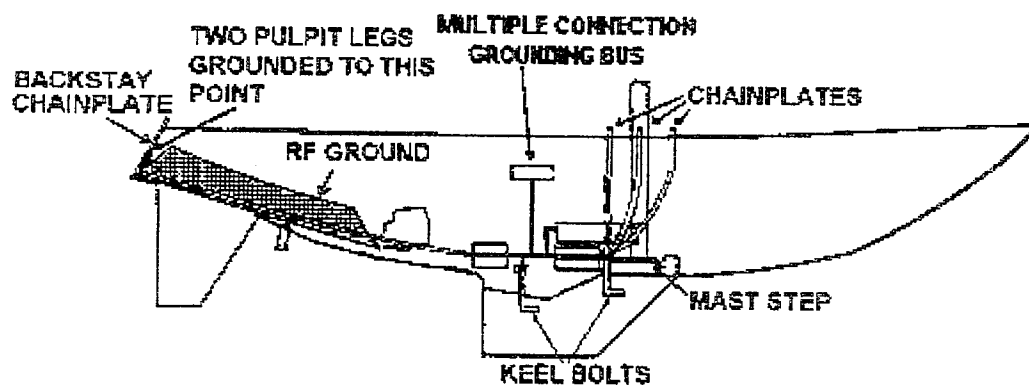
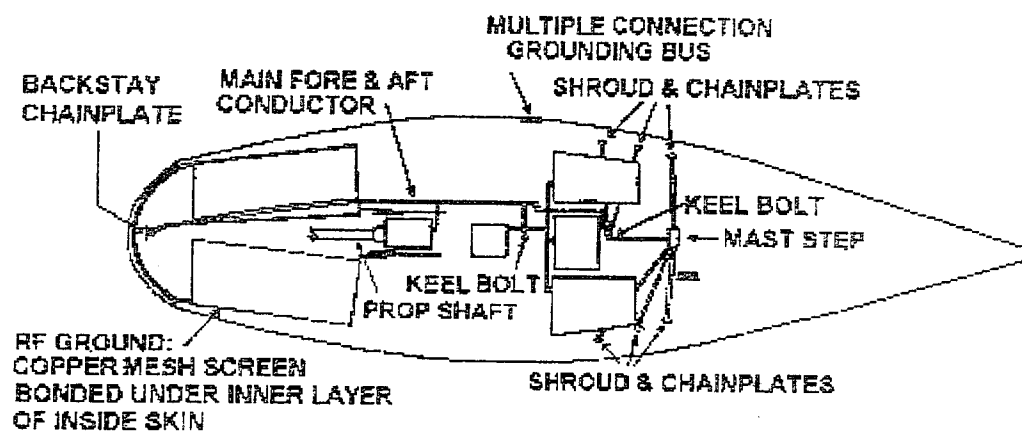


Figure 1-33. Bonding and Grounding

Table 1-3. COMMUNICATIONS AND ELECTRONIC SYSTEMS

ITEM	SYSTEM	MODEL
1.	Depth Sounder	Brooks & Gatehouse HECTA, (NA1-NA8) Brooks & Gatehouse HYDRA, (NA9-NA20)
2.	LORAN - C	Northstar 800
3.	Radar	Raytheon R20 (NA1-NA8) Raytheon R20X (NA9-NA20)
4.	HF/SSB	Stephens SEA 222
5.	VHF Radio	Icom M-100 (NA1-NA8) Icom M-120 (NA9-NA20)
6.	GPS	Northstar 941x (NA-11) Trimble Navtrac NA-2, NA-7, NA-17)
7.	Weather Facsimile	Furuno FAX 208A (every fourth boat)
8.	Sailing Instrument	Brooks & Gatehouse HORNET 4, (NA1-NA8) Brooks & Gatehouse HYDRA, (NA9-NA20)

- Aqua Signal combination masthead light and deck flood light is mounted on the forward side of the mast above the lower spreader and activated by switches on the switchboard panel "masthead" and "deck" respectively.

#### 1-7.4 THE COMMUNICATIONS AND NAVIGATION SYSTEMS

Communications and Navigation systems are located at the navigation station inside the cabin to port and consists of a chart table, a cushioned seat, and the communications and electronic navigation systems. The navigation station includes a chart table for the storage of charts, navigation tools and publications. Communications and Electronic Arrangement, are listed in Table 1-3, COMMUNICATIONS AND ELECTRONIC SYSTEMS

##### 1-7.4.1 NAVIGATION STATION AND CHART TABLE

The chart table is approximately 3 feet, 7 inches long by 2 feet, 2 inches wide with a hinged top to provide chart stowage underneath. The space under the Nav Station seat is used for SS Battery Banks. Rotary switches, (either Guest or Perco mfg), are mounted on the forward vertical surface such that they are easily reached by a crew member sitting at the navigation station. The electronic and navigation/communications equipment, and switchboard panel, are located on the port and forward bulkheads of the navigation station. The bilge alarm and thru-hull gravity switches for the depth sounder and speed log transducers are located below the chart table. The 120 vac battery charger has been moved from the head to the knee hole of the Nav Station. See Figure 1-34, Communications and Electronics Arrangement.

##### 1-7.4.2 VOICE COMMUNICATIONS.

The voice communications systems installed on the Navy 44 consist of:

- A Very High Frequency (VHF) Radio for primary communication.
- High Frequency/Single Sideband (HF/SSB)

The VHF radio has all marine and weather channels pre-programmed. It can store up to 16 user selected channels. A dual watch mode is provided for monitoring Channel 16 while listening on a different channel. Four different channel scanning patterns are also provided. There are two speakers associated with the VHF radio. One located at the NAV Station, and one in the cockpit on the vertical face of the helmsman's seat. A speaker selector switch is mounted on the bulkhead above the radio with three positions: local, remote, both.

See Figure 1-35. VHF Speaker Selector Switch.

The HF/SSB radio is a Stephens SEA 222 mounted above the overhead shelf to port. It can store operator entered channels for easy access. The insulated backstay is used as the HF/SSB long wire antenna. This dual purpose antenna also services the Facsimile Receiver (FAX). A switch in the navigation station selects either the HF radio or FAX.

#### CAUTION

The SSB transceiver can be damaged if transmission on HF is attempted with the antenna in the FAX position.

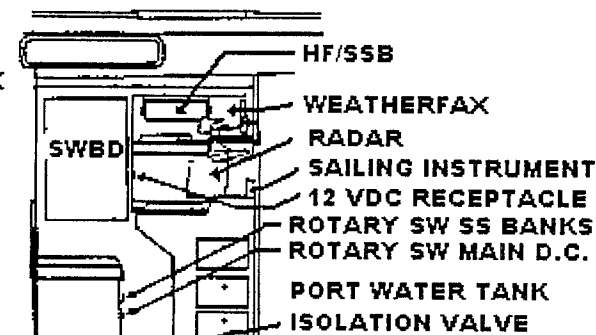
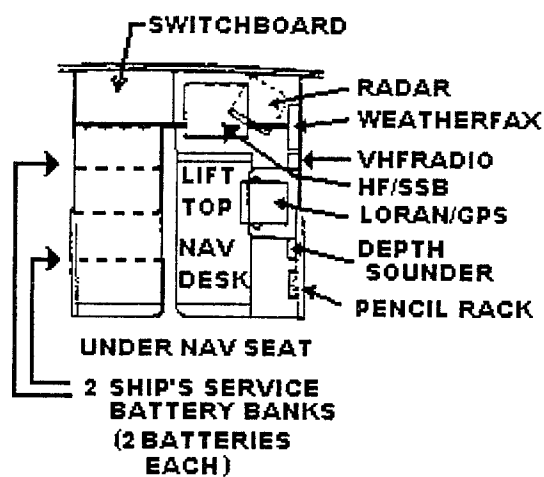
##### 1-7.4.3 NAVIGATION SYSTEMS.

There are multiple models for each item of navigation equipment on the Navy 44. Each boat is provided with a technical publications package that contains the operating instructions for the particular units installed.

This includes the:

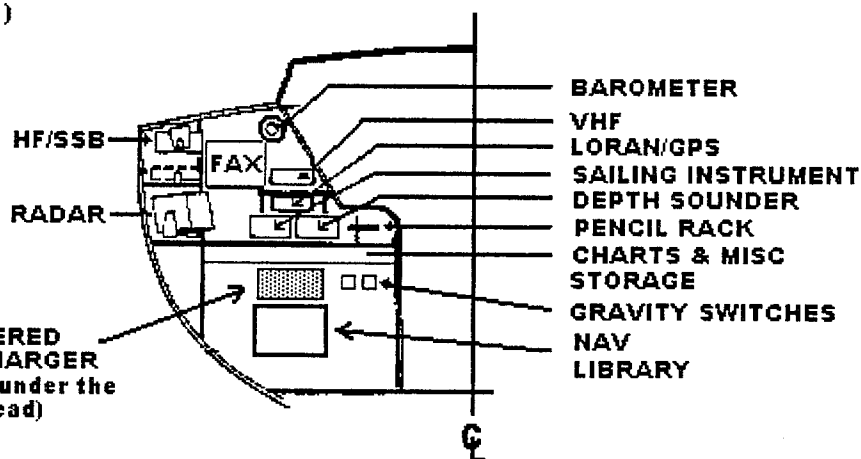
- Depth Sounder
- LORAN-C/GPS,
- Radar
- Weather Facsimile
- Sailing Instrument

## TOP VIEW



## LOOKING TO PORT

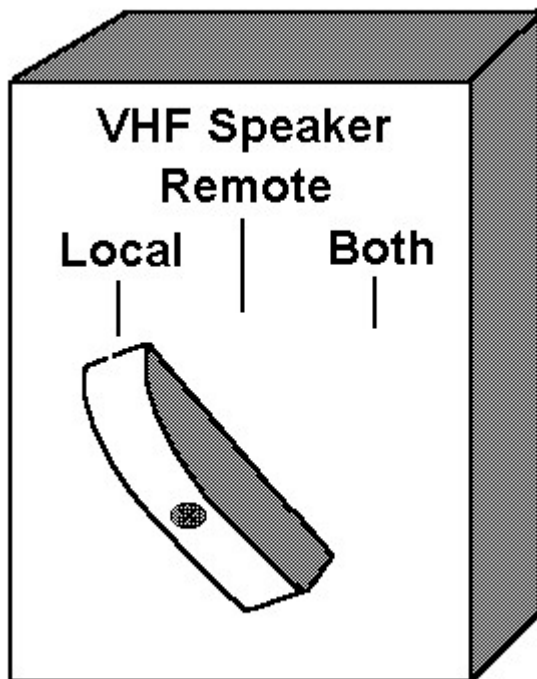
\* ENGINE START BATTERY HAS BEEN MOVED. SEE FIG. 1-30



## LOOKING FORWARD

Figure 1-34. Communications and Electronics Arrangement

Figure 1-35 VHF Volume Switch



#### 1-7.4.3.1 DEPTH FINDER

The Navy 44 is equipped with one of two models of Depth Finders: the Brooks & Gatehouse HECTA depth sounder monitor on (NA1 thru NA8) or the Brooks & Gatehouse HYDRA 330 (NA9 thru NA20). The installed unit is mounted on the forward bulkhead of the navigation station. Both systems have a depth repeater located on the forward bulkhead of the cockpit. The depth sounder can display depth from the surface or under the keel, as set by the operator. The monitor has both shallow water and deepwater alarm features. The depth sounder is connected to two transducers forward of the keel. Gravity switches located under the Nav desk select the appropriate unit depending on the heel of the hull. These switches can be set to manually select the desired transducer independent of the gravity switch.

#### 1-7.4.3.2 LORAN-C

A Northstar 800 LORAN-C receiver is mounted on a shelf on the navigation station bulkhead above the depth sounder. The compact LORAN-C unit provides position readouts in LORAN-C TD's or latitude-longitude. It can display course, speed, time-of-day and way point readouts. The LORAN-C antenna is located on the stern pulpit.

#### 1-7.4.3.3 RADAR

The Navy 44 is equipped with one of two radar systems: the Raytheon R20 on (NA1-NA8) or the Raytheon R20X on (NA9-NA20). The 7-inch diagonal TV-type display is mounted on a shelf to port of the chart table. The R20 radar has a maximum range of 16 miles, (R20X max range of 24 mi.), which provides a 360 degree radar picture of other vessels, buoys, and landfalls surrounding the boat. A unique feature allows picture "freeze" for bearing and range measurements. The Electronic Bearing Line "EBL" and Variable Range Marker "VRM" controls allow for accurate measurement of bearing and range, and the "Seaguard Alarm" alerts the operator of

an object entering a safety zone. The R20X receives inputs from the LORAN-C receiver and HYDRA 330 to provide bearings to contacts and bearing/distance to waypoints on the radar scope. The encased radar scanner/antenna is deck mounted on a 6 foot, 5-inch aluminum pipe aft of the cockpit to starboard.

#### 1-7.4.3.4 NORTHSTAR GPS UPGRADE

NA-9 thru NA-12 have a GPS upgrade chip that provides for display of position. Selected Navy 44's are equipped with a GPS source. The display shows "GLAT" and "GLON".

#### 1-7.4.3.5 FACSIMILE RECEIVER

Selected Navy 44's are equipped with the Furuno FAX 208A Weather facsimile receiver is mounted on the port bulkhead just forward of the navigation station in the main cabin. The facsimile is preprogrammed with all existing facsimile stations and frequencies that may be updated by the user. Fully automatic reception is provided with built-in on/off/sleep schedule timer and auto speed/IOC selection. The FAX receiver uses a dual-purpose antenna shared with the HF/SSB transceiver.

#### CAUTION

The SSB transceiver can be damaged if HF transmission is attempted with the antenna in the FAX position. Ensure that the switch is in the HF position prior to keying the mike.

#### 1-7.4.3.6 SAILING PERFORMANCE INSTRUMENT

A Brooks & Gatehouse Hornet 4 (NA1-NA8) or HYDRA 330 (NA9-NA20) Sailing Monitor system provides navigation information. The Hornet 4 has boat speed, wind speed and wind direction displays mounted on the forward bulkhead of the navigation station and digital repeaters on the forward cockpit bulkhead to starboard. Both systems have analog repeaters on the forward cockpit bulkhead to port. The

HYDRA 330 has an additional repeater on the cockpit bulkhead to stbd and reads water temperature from the “speedo” transducer. The wind direction and speed sensors are mounted on the masthead. Two boat speed underwater paddlewheel transducers are installed forward of the keel, port and starboard, either of which provides continuous activation by a gravity changeover switch. A “dummy” plug can be substituted so that the thru-hull paddlewheel sensors can be removed for cleaning.

#### 1-7.4.4 NON-ELECTRONIC NAVIGATION INSTRUMENTS

Non-electronic navigation instruments on board include magnetic compasses, a sextant and a barometer.

##### 1-7.4.4.1 MAGNETIC COMPASS

The main magnetic compass is a 6-inch RITCHIE Globemaster, Model D-615EP mounted on the Edson steering pedestal in the cockpit and is used by the helmsman. The compass card is scribed in 5-degree increments, and is equipped with 45 degree and 90 degree offset lines. It is equipped with low level 12 volt D.C. lighting. A removable sliding door stainless steel hood helps to protect the face of the compass.

Another compass, C. Plath Merkur 4-3/4 inch, mounted on the forward starboard bulkhead of the cockpit has 12 volt D.C. night lighting, 5-degree card, and a clinometer.

##### 1-7.4.4.2 BAROMETER

A barometer is mounted on the forward bulkhead of the navigation station.

##### 1-7.4.4.3 SEXTANT

A sextant is brought aboard by the crew and stowed at the navigation station.

#### 1-7.5 FRESH WATER SYSTEM

The fresh water system delivers fresh water by an electrically operated, pressurized pump and accumulator system and a manually operated

foot-pump system. It consists of three stainless steel tanks with a total capacity of 163 gallons. A 70-gallon tank is located under each settee berth in the main cabin. Each tank is fitted with an ITT Jabsco Model 45570 shut off valve to isolate it from the 23-gallon “day” tank located below the cabin sole on centerline port of the galley. The 6-inch diameter access ports on each tank have a fill connection and a Rochester Gauge Inc., Type 8200 spiral action float level indicator. Tanks are vented with 1-1/2 inch plastic hoses that have a loop that rises higher than deck level in the hanging locker port side and in the storage locker starboard side. NA-1 has the isolation valve under the aft corner of the settee berth. All other boats have the isolation valve under the galley sink.

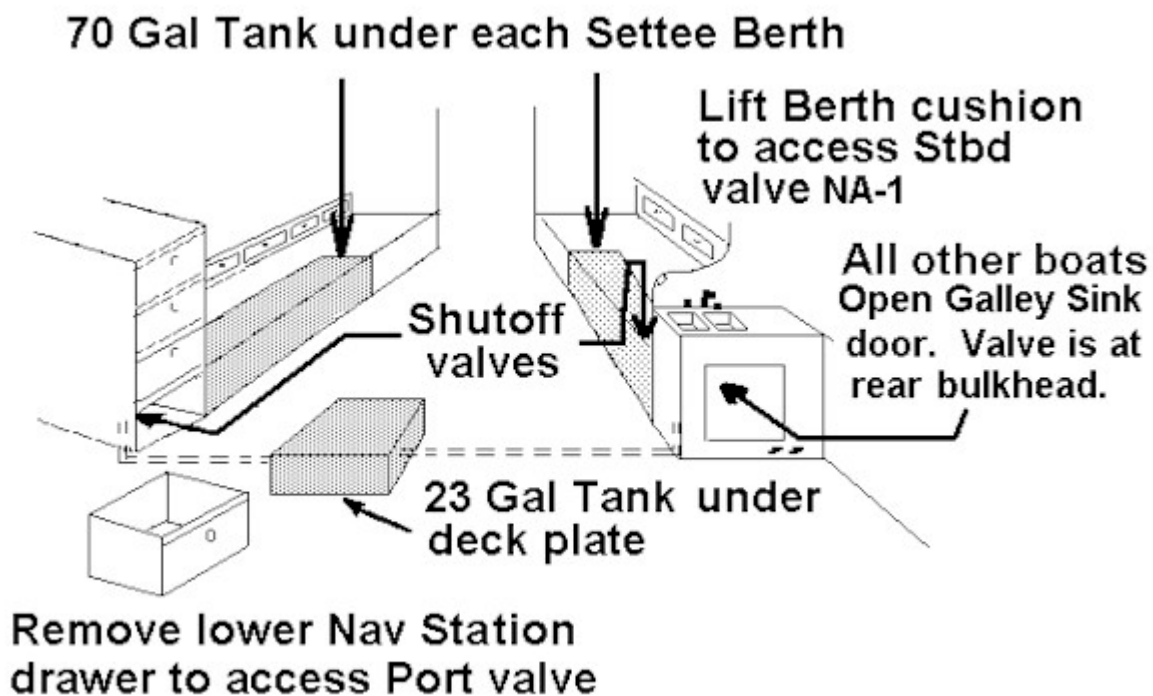
The pressurized system includes an automatic pressure switch, PAR Model 36900 1000, a 4.2 gallons per minute belt driven diaphragm pump, and a PAR 12573-2000 accumulator tank. As required the pump is being replaced with a PAR-MAX3 model JAB 306200012, 3.4 gallons per minute rotary diaphragm pump. The manually activated fresh water Whale Gusher MK III foot pumps supply fresh water: one to the galley sink, and one to the fresh water telephone shower/sink in the head.

Grey water from the head sink drains into the shower sump and must be pumped out using the manual shower sump pump located on the aft bulkhead in the head compartment. See Figure 1-36, Fresh Water System.

#### 1-7.6 SEA WATER SYSTEM

A pressurized sea water system has an automatic pressure switch, PAR Model 36900 1000, a 4.2 gallons per minute belt driven diaphragm pump, and a PAR 12573-2000 accumulator tank. As required the pump is being

Figure 1-36. Fresh Water System





replaced with a PAR-MAX3 model JAB 306200012, 3.4 gallons per minute rotary diaphragm pump. All are located under the galley sink. The system is protected by a PAR 36200-0000 in-line strainer. This strainer required no tools to service. To open and remove the clear plastic housing, grasp the housing and turn counter clockwise. Remove the strainer screen for cleaning, replace the strainer and screw the plastic housing back on with firm hand pressure. Pressurized seawater is supplied to the galley sink and to the seawater shower unit in the head. Water from the galley sink is removed through the galley drain into the galley drain seacock. Water from the head sink drains into the shower sump and must be pumped out with the manual shower sump pump located on the aft bulkhead in the head compartment. See Figure 1-37, Sea Water System, and Figure 1-38 In-Line Strainers.

#### 1-7.7 BILGE PUMPING SYSTEM

The Navy 44 is equipped with one electric bilge pump, and two manual pumps. A RULE 3500, located on centerline amidships in the bilge well, powers the electric system. The RULE 3500 pump has a 58-gallon per minute capacity and is activated by a switch on the switchboard panel. The bilge water outlet is a 1-1/2 inch flush mounted thru-hull fitting located on portside above the waterline amidships.

Two manual diaphragm bilge pumps are installed. One activated from inside the cabin, and the other from outside in the cockpit to comply with offshore racing requirements. An Edson Model 638A, 30 gallons per minute capacity is under the cabin sole midships. A Perko strainer screen, 722-00-PLB, has been added to the pickup fitting in the bilge well. The discharge line leads to a portside discharge thru-hull fitting above the waterline. Access for the pump handle is through a slot cut in the cabin sole deck plate. The handle for this pump is mounted on the front face, starboard side for the wet storage lockers aft of the navigation station.

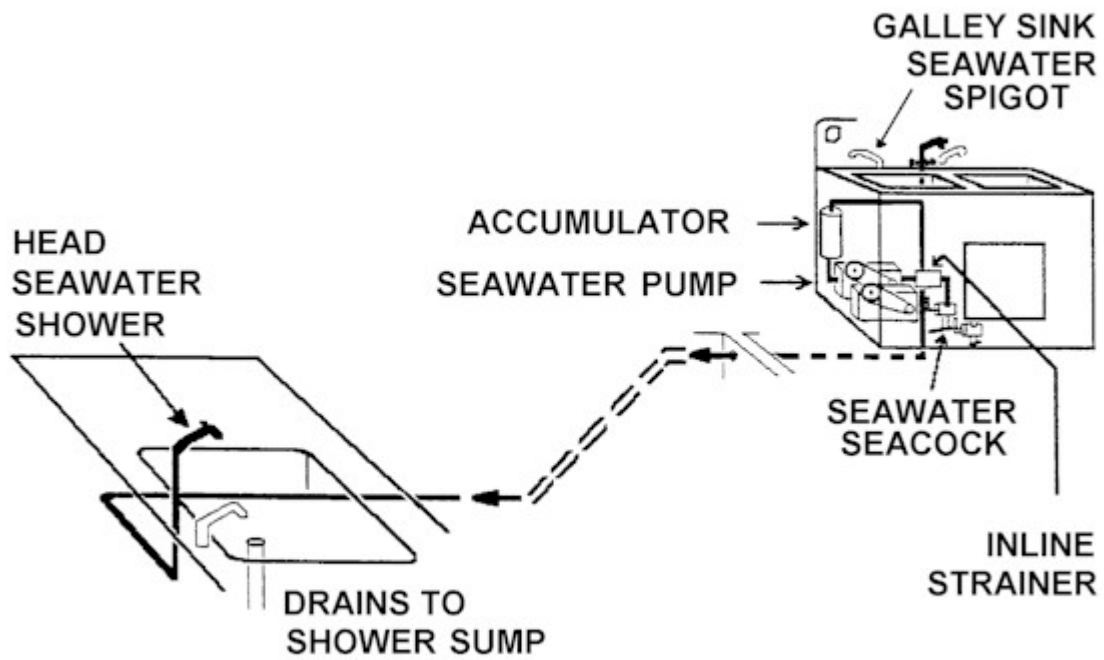
An Edson Model 554, 30 gallons per minute capacity, is located under the portside cockpit seat, and leads to a discharge thru hull fitting on the transom. This discharge hose has also been fitted with a strainer screen. Due to the long run of the hose a check valve has been located at the pick up end in the bilge well. The handle for this pump is stowed in the port cockpit sheet locker.

#### 1-7.8 ALARM SYSTEM

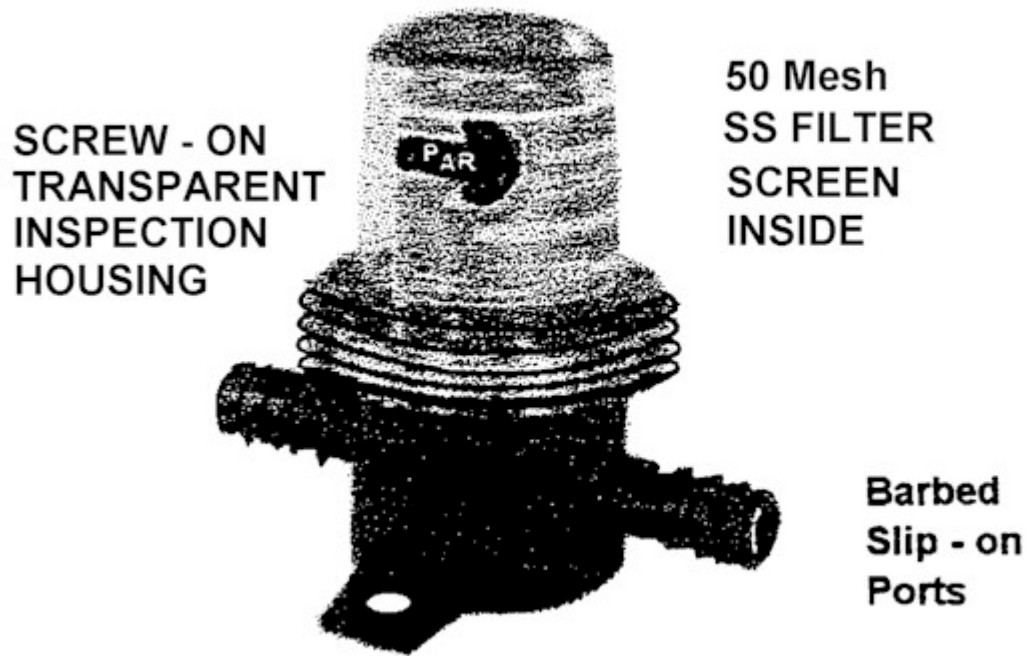
The Navy 44 is equipped with four alarm systems. One is the high fluid alarm in the bilge. The second is an engine overheat alarm. The third is the engine low oil pressure alarm. These alarms are described in the paragraphs below. The fourth is the alarm in the RACOR fuel filter that warns of high water content in the sediment bowl. It has a self-test that will sound when d.c. power is applied to the boat. The alarms are powered by 12 VDC. See Chapter 5, Emergency Procedures, ALARMS, for actions to be taken in the event any of these alarm activate.

##### 1-7.8.1 BILGE ALARM

The BILGE ALARM circuit breaker on the switchboard panel energizes the circuit. The bilge alarm float switch located half way up on the forward face of the bilge compartment under the deck plates near the Navigator's bench closes when enough water collects to raise the lever in the switch and triggers a 6" Bell mounted below the Chart Table in the Navigation Station. The BILGE ALARM circuit breaker, must be ON at the switchboard AT ALL TIMES to provide safety when the boat is not manned.



1-38. In-Line Strainer



#### 1-7.8.2 ENGINE HIGH TEMPERATURE ALARM

The Engine Alarm switch on the switchboard energizes the engine alarm circuit. There is a High Temperature Switch located in the water section of the engine that triggers a constant pitch continuous buzzer when the engine operating temperature exceeds the normal range. The ENGINE ALARM circuit breaker must be ON at the switchboard.

#### 1-7.8.3 ENGINE LOW OIL PRESSURE ALARM

The same Engine Alarm Circuit breaker located on the switchboard panel that energizes the high temperature alarm energizes the engine low oil pressure alarm circuit. There is a Low Oil Pressure Switch located in the oil manifold across the rear of the engine. When engine oil pressure is below the threshold pressure the oil pressure alarm will activate. The ENGINE ALARM circuit breaker must be ON at the switchboard.

#### 1-7.9 MOORING AND TOWING FITTINGS.

The Navy 44 deck has fittings for mooring, towing and anchoring lines. Four (4) Buck-Algonquin Model BCS-800-S open skene mooring chocks are fitted on deck; two (2) on the bow (P&S) and two (2) over the transom (P&S). Close to each skene chock is a corresponding mooring cleat, Buck Algonquin Model SOBS-1200.

There are four (4) closed rail chocks bolted on to the toe rail; two (2) amidships (P&S), and two (2) on the stern quarters (P&S). In addition to dockside mooring, these fittings may be used for anchoring, towing, and being towed. Five (5) 5/8-inch diameter, three strand twist nylon lines are stowed aboard for docking and mooring lines. See Figure 1-39, Mooring Arrangement.

#### 1-7.10 ANCHOR STOWAGE AND HANDLING

There are two (2) anchors on board the Navy 44.

One (1) 35-pound Deepset Danforth anchor is stowed horizontally against the inside of the hull to starboard in the forward cabin compartment. Lashing eyes and chocks are provided for secure stowage. 6 feet of 3/8-inch chain and 250 feet of 5/8-inch diameter 3-strand nylon anchor line is stowed with the anchor.

One (1) 20-pound Hi-Tensile Danforth anchor is stowed under the radial drive aft with 6 feet of 3/8-inch chain and 250 feet of 1/2-inch 3-strand nylon anchor line. See Figure 1-40, Stowage, Top View, and Table 1-4 Stowage Plan.

#### 1-7.11 GALLEY

The galley is located inside the cabin to starboard amidships and consists of a stove, refrigerator, sink and stowage compartments. The galley is fitted with Formica countertops, sea rails, and pantry locker with racks and shelves. See Figure 1-40.

##### 1-7.11.1 STOVE

The stove is a Paul E. Luke, Inc. Model 5 Heritage gimbaled three top burner range with oven. The stove burns liquefied petroleum gas (LPG). Two (2) 10-pound vertical aluminum LPG bottles with a manifold valve, pressure regulator, and pressure gauge are stowed in a drained and vented gas-tight compartment to starboard of the helmsman's seat. The LPG line is fitted with a Marinetics Corporation Model 906/907 LPG control shut-off valve and a solenoid cutoff valve in the tank compartment. The solenoid cutoff valve is activated by a control shut-off switch mounted on the galley bulkhead. This switch is powered by a circuit breaker on the switchboard panel. See Figure 1-41. Solenoid Control.

Figure 1-39 Mooring

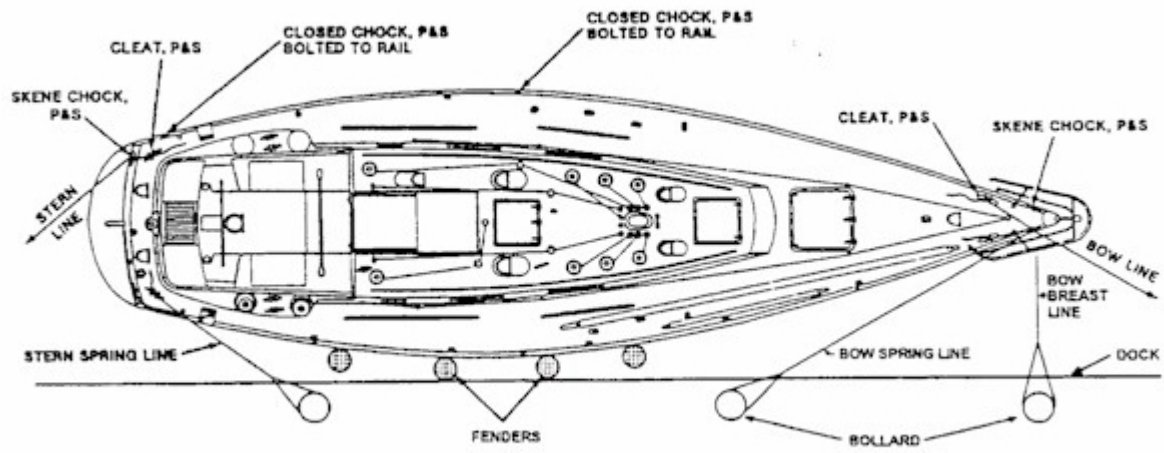


Figure 1-40. Stowage Top View

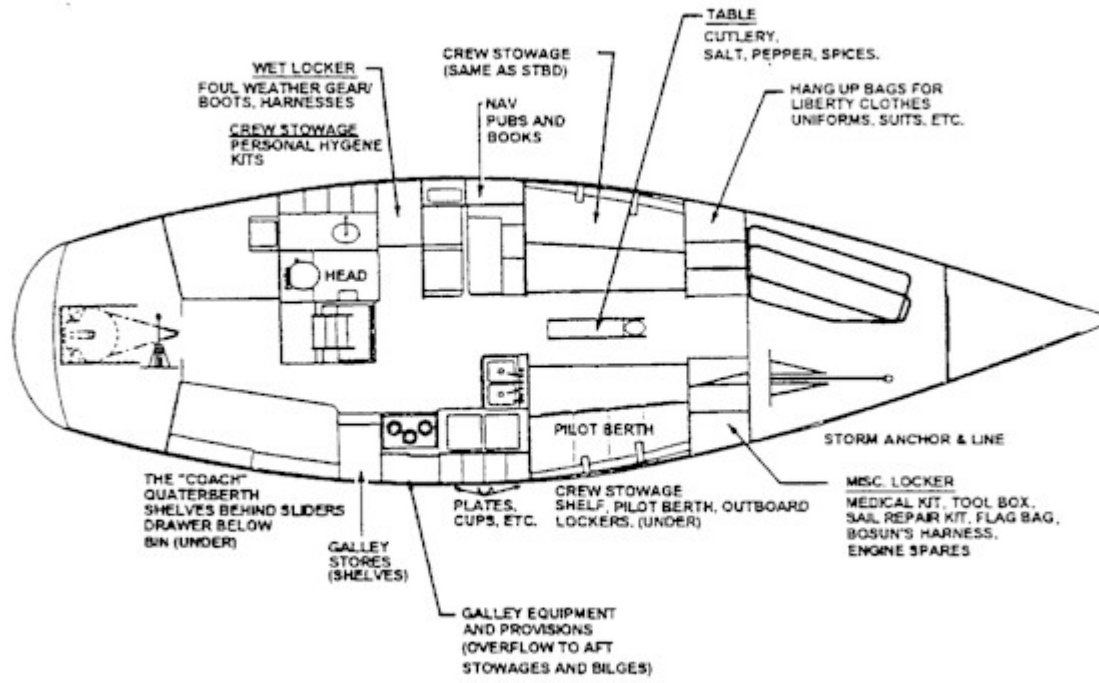


TABLE 1-4 STOWAGE PLAN

COCKPIT

Port Forward Locker	Mooring lines and fenders, Sheets, Guys
Port Aft Locker	Emergency Tiller, Life Jackets
Starboard Forward Locker	Ready-use, Emergency, On-Watch equipment, Flashlights, Fog Horn, Hernia Box of spare deck hardware.

CABIN

Fwd Stbd Stowage (behind mirror door)	Damage Control Kit. Electrical Kit. Bulky Provisions. Other Bulky Items. Tools/Repair Kit. International Flags. Bosun's Section containing Sail Repair Kit, Spare Shackles, Blocks, Splicing Gear, Reefing Lines, etc. Tool Box, Flare Kit
Fwd Port Miscellaneous Locker (behind mirror door)	Cleaning gear, misc. paper supply spares, hanging locker for crew liberty bags.
Wet Locker: (Port side Aft of Nav Station, Fwd of Head).	Crew Sailing Boots. Foul Weather Gear. Safety Harnesses.
FOC'SLE:	<p>Stbd Upper pipe berth = # 1 Genoa</p> <p>Stbd Lower pipe berth = # 3 Jib</p> <p>Stbd under pipe berth = Storm Jib &amp; Storm  Trysail (same Bag).  = 35 lb. Danforth Heavy  weather anchor (w/rode  attached under anchor)</p> <p>Port Upper pipe berth = # 2 Genoa</p> <p>Port Lower pipe berth = # 4 Jib &amp; 1.0 Spinnaker</p> <p>Port Fwd under  Pipe berth = Day Shapes</p>

BEHIND ENGINE:

Cubby, port side	<p>Plastic jug with spare engine oil</p> <p>Plastic jug with spare anti-freeze coolant</p> <p>Plastic jug with spare battery water</p> <p>Bar-B-Que grill (optional)</p>
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Steering Compartment	20 lb. Hi Tensile Danforth (w/rode attached)
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Figure 1-41. Solenoid





#### 1-7.11.2. REFRIGERATOR

The NA 44 is equipped with a two door, top opening, 8.1 cubic foot refrigerator located in the galley countertop, starboard side. All boats now have the TECHNAUTICS COASTAL 12, a completely 12 vdc system. The compressor unit is located on the afterside of the bulkhead at the foot of the quarterberth. The holding plate is located in the refrigerator (reefer) compartment. A thermostat located inside the aftermost door of the reefer controls the temperature of the reefer box. This system draws power from SS battery banks thru the SS rotary battery switch.

At pier side, shore power can be applied to the boat and the A.C. battery charger, relocated under the NAV Station, can be energized using the switch on the Switchboard Panel, (lower left corner of the panel), to charge the batteries while they are cooling the reefer. At sea the reefer can be charged using the 12 vdc. switch located on the D.C. portion of the Switchboard Panel. A longer charging time will be experienced with the new refrigeration system. Close monitoring of the SS Battery Bank condition, referring to the System Voltage Scanner (SVS), is recommended.

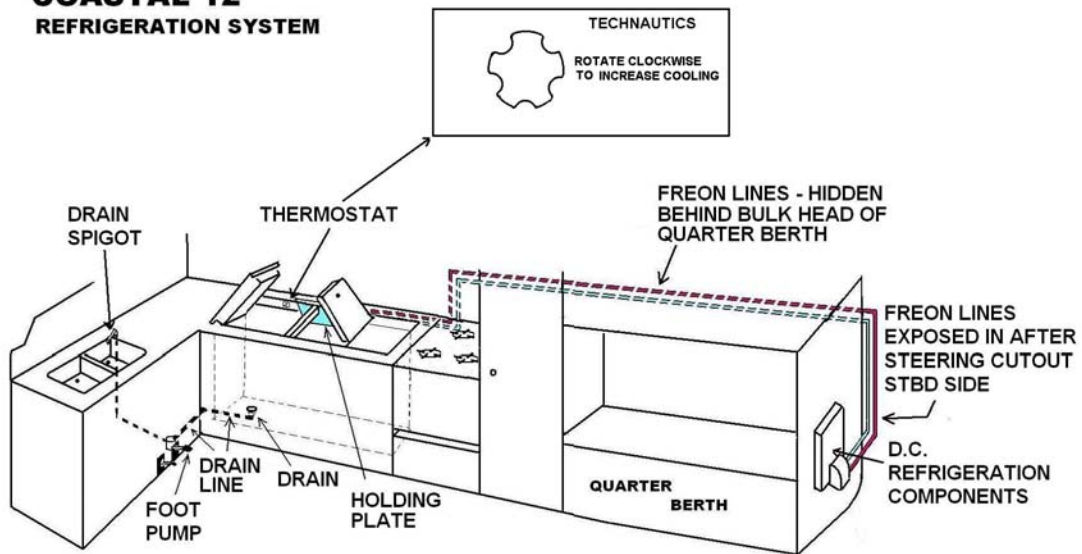
A thaw drain line leads from the bottom of the reefer compartment to the STBD Whale Gusher MK III foot pump located on the front face of the galley sink at floor level. The other foot pump is for the manual fresh water system.

#### 1-7.11.3 GALLEY SINK

A double stainless steel sink is mounted in the countertop of the galley and is fitted with three spigots. The main spigot, is a Grohe G-1/2 31 634, fitted with a six foot hose allowing the spigot to be pulled out of the sink receptacle as a telephone shower head. A selector lever in the top of the spigot selects direct flow or spray. The left knob, (blue knob), controls pressure fresh water. The other, (red knob), controls fresh water supplied by the PORT Whale Gusher Mk III foot pump located on the front face of the sink compartment at floor level. The other two spigots are (2) Fynspray WS6 swiveling spouts: one for the reefer drain, (STBD side of the sink), and one for pressure sea water, (port side of sink)..

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DUE TO ELIMINATION OF THE OLD  
GRUNERT REFRIGERATION SYSTEM.

# **TECHNAUTICS COASTAL 12 REFRIGERATION SYSTEM**



#### 1-7.12 LIFE SAVING EQUIPMENT

One (1) Avon 10-man YM-(E) life raft is stowed below the bridge deck in the cockpit.

One (1) yellow horseshoe-type life buoy is mounted on a stainless steel rack on the starboard stern pulpit which has a strobe light, whistle and small drogue attached and is connected to the man-overboard pole.

One (1) man overboard pole is stowed in a tube below deck to starboard, exiting through the transom.

One (1) life sling is mounted on the portside stern pulpit.

Ten (10) adult size Navy Standard Kapok Type I life jackets are furnished on board and are stowed in the aft port lazarette cockpit locker.

The SOLAS Pyrotechnics kit is two yellow plastic waterproof containers stowed in the port cabin locker behind the mirror door and consists of the following items:

- 12 Red Parachute Flares
- 4 Red Hand-held
- 4 White Hand-held
- 2 Smoke Canisters
- 2 USCG Red Hand-held (non-SOLAS)

#### NOTE

THE PYROTECHNICS MEET THE US SAILING REQUIREMENTS FOR CATEGORY 1 OFFSHORE RACING.

Inflatable personal flotation devices (PFD) with safety harness are available for issue from the cutter shed.

#### 1-7.13 CABIN

Cabin spaces described here include:

- Berthing spaces
- Mess Table
- Head Compartment

#### 1-7.13.1 BERTHING

The Navy 44 is arranged with five (5) berths with mattresses in the main cabin as follows:

One (1) pilot berth and one (1) settee berth to Port.

One (1) pilot berth and one (1) settee berth to Starboard.

One (1) quarter berth aft of the galley on the starboard side.

Additionally four (4) hinged pipe berths in the forward compartment, two to each side. Berth dimensions are approximately 76 inches by 25 inches. The berths in the main cabin have 4-inch foam cushions and are fitted with adjusting block and tackle to allow for heeling and Acrilan lee cloths. The pipe berths have adjusting block and tackle and are usually used for sail storage. See Figure 1-6.

#### 1-7.13.2 MESS TABLE

A Formica-topped mess table is available for mounting on centerline aft of the mast (between settee berths) and is fitted with hinged drop leaves, sea rails and lift-out panels for stowage. The table is normally removed so as to accommodate different space arrangements. See Figure 1-6.

#### 1-7.14 HEAD COMPARTMENT

The head is located aft and to port inside the cabin and consists of the marine head, sink, shower units, mirror, and stowage shelves.

#### 1-7.14.1 MARINE HEAD

The Wilcox-Crittenden "Skipper" marine head uses raw seawater for flushing. Pushing down on a foot lever opens the plumbing to incoming seawater. Fore and Aft action on the hand operated flushing lever brings in seawater and pumps out the water in the bowl. Releasing the foot lever closes a valve to shut off incoming seawater and aligns the pump to clear the bowl. Using the hand operated flushing lever pumps the bowl dry.

Effluent is discharged from the head through a 1-1/2 inch discharge line which is routed to a "Y" valve located in the storage area portside aft of the engine compartment.

The valve has a long shank that protrudes through the bulkhead and is operable from the head compartment. With the handle pointing to the placarded "Tank" position, effluent is directed to the Holding tank. With the handle pointing to the "OVBD" position, effluent is directed overboard.

A polypropylene holding tank with a capacity of approximately 10 gallons is fitted to the head system and makes the Navy 44 compatible with ZERO discharge laws for environmentally protected waters. Plumbing from the holding tank leads to a diverter valve located on the front face of the Port Forward Cockpit Locker. With the handle pointing inboard the effluent can be pumped overboard using the macerator pump. This procedure is authorized only when beyond the three mile limit in open ocean. With the handle pointing outboard the holding tank can be pumped out at a shore side pump out facility using the deck plate pump out receptacle. If removal of the toilet is necessary for servicing, remove the discharge hose fitting from the toilet body; do not remove the hose and hose clamps from the fitting. For components of the head system, See Figure 1-43. MSD Schematic and Figure 1-44. Holding Tank.

#### 1-7.14.2 "Y" Valve

The Navy 44's are being fitted with a modified "Y" valve. This valve has an extended shank to allow for mounting of the "Y" valve in the storage area aft of the head, port side, and allowing the shank to protrude through the bulk head into the head compartment. The control handle is mounted in the head compartment on the aft bulkhead inboard of the head. Placards identify the position of the valve, "TANK" or "OVBD". See Figure 1-45 "Y" Valve installation.

#### 1-7.14.3 HEAD LAVATORY SINK/SHOWER

The lavatory sink in the head compartment is fitted with one swiveling spout for Sea Water and two types of faucets:

- One Fynspray WS6 swiveling spout with two knobs.
- One knob (color coded blue), for pressure fresh water, and the other knob (color coded red), for fresh water supplied by a Whale Gusher MK III foot pump. Spigot is on an extension hose for use as a telephone shower.

#### 7-15 THRU-HULLS

There are eleven under water thru-hulls and six above waterline openings to accommodate drainage requirements for the systems aboard the Navy 44. See Figure 1-47 Thru Hull Diagram. For tabulation see Table 1-5 Thru Hull Fittings.

There are two thru-hulls in the bow section port side as provisions for a second head that have been capped off. In NA-9 thru NA-12 fittings have been faired to eliminate a disturbance to the laminar flow of the water.

Not included on the list are the hull penetrations for the propeller shaft and rudder stock.

End of text for Chapter One.

Figure 1-43 MSD Schematic

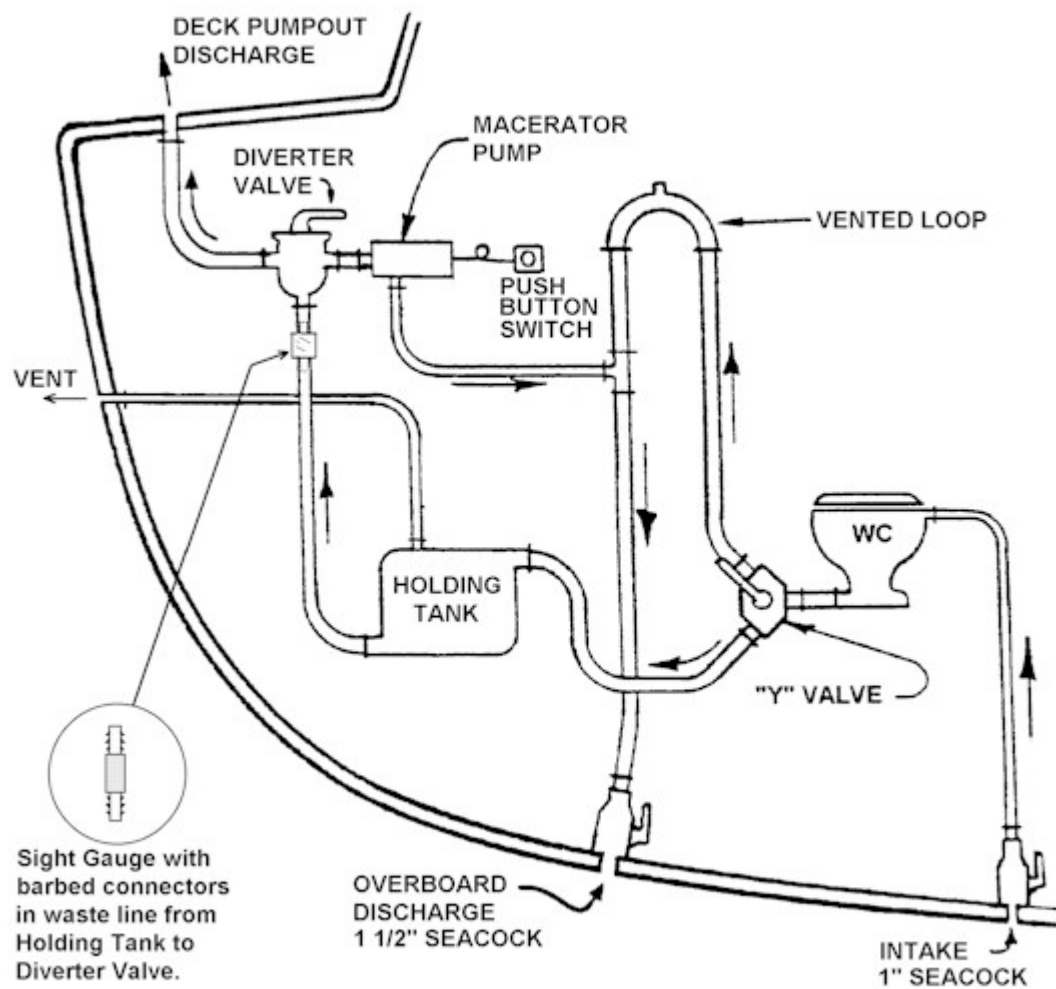


Figure 1-44 Holding Tank

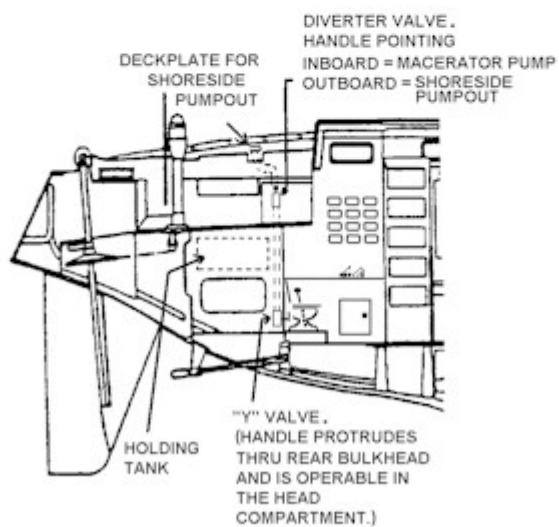
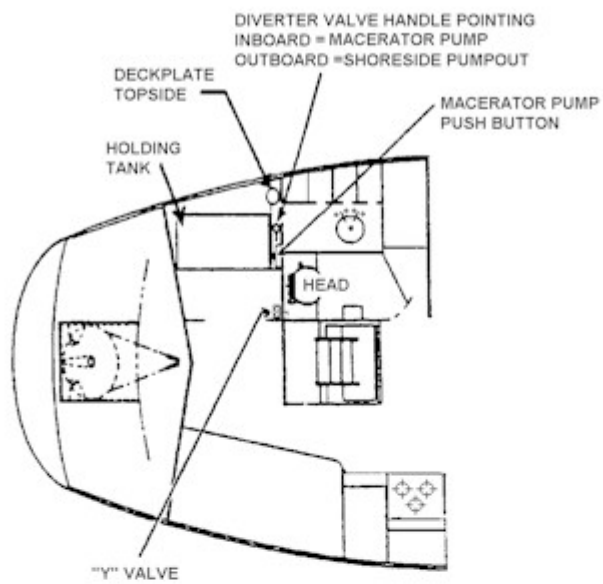


Figure 1-45 “Y” Valve + handle install

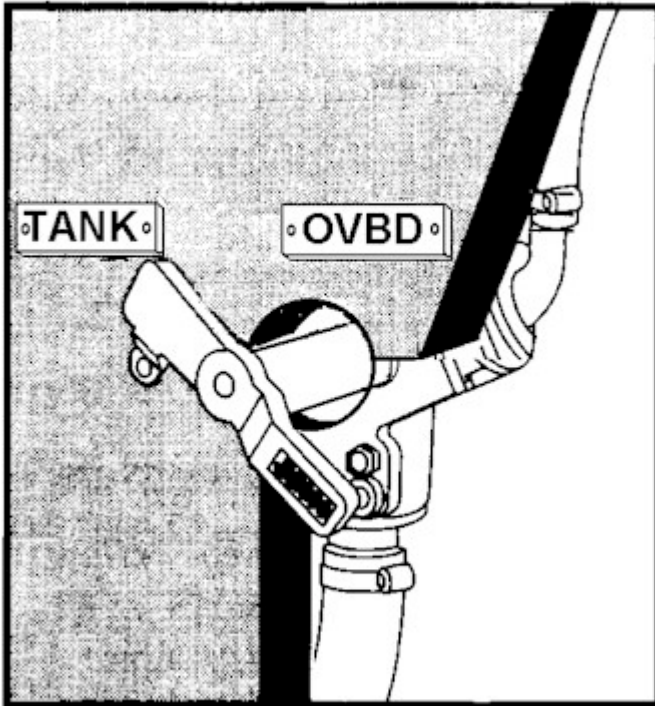


Figure 1-46 Thru Hull Diagram

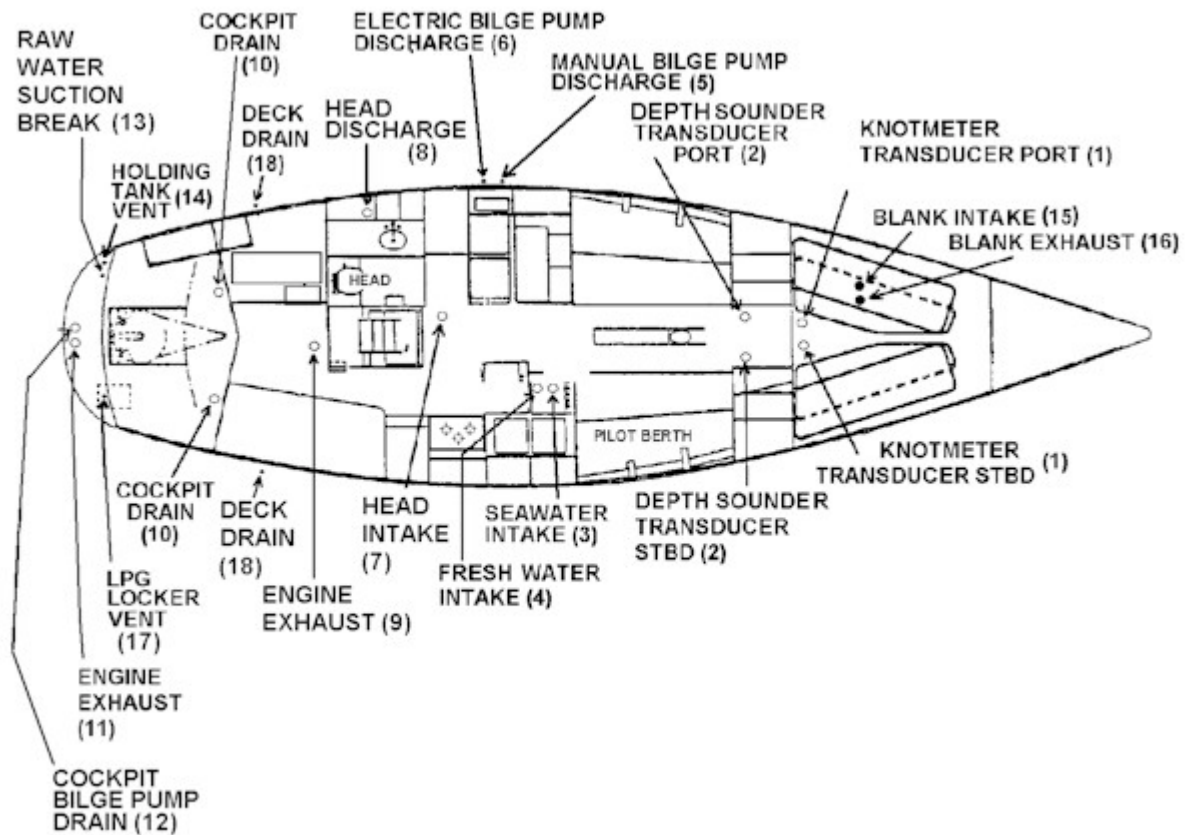




Table 1-5. THRU-HULL FITTINGS

REF	NO	SERVICE	SIZE	LOCATION
1	2	KNOTMETER PADDLEWHEEL TRANSDUCER	50 mm	FWD, PORT/STBD.
2	2	DEPTH SOUNDER TRANSDUCER	40 mm	FWD, PORT/STBD.
3	1	SEAWATER INTAKE	3/4 INCH	BELOW GALLEY SINK
4	1	GALLEY DRAIN	1 ½ INCH	BELOW GALLEY SINK
5	1	MANUAL BILGE PUMP DISCHARGE	1 ½ INCH	MIDSHIP, PORT, ABOVE WATERLINE
6	1	ELECTRIC BILGE PUMP DISCHARGE	1 ½ INCH	MIDSHIP, PORT, ABOVE WATERLINE
7	1	HEAD INTAKE & SHOWER SUMP DRAIN	3/4 INCH	GALLEY DECK FWD OF ENGINE COMPARTMENT
8	1	HEAD DISCHARGE	1 ½ INCH	UNDER SINK IN HEAD COMPARTMENT
9	1	ENGINE INTAKE	3/4 INCH	AFT OF ENGINE COMPARTMENT
10	2	COCKPIT DRAINS	2 INCH	RADIAL DRIVE COMPARTMENT AFT OF QUARTERBERTH
11	1	ENGINE EXHAUST	1 ½ INCH	TRANSOM, CENTER, ABOVE WATERLINE
12	1	COCKPIT BILGE PUMP DISCHARGE	1 ½ INCH	TRANSOM, PORT ABOVE WATERLINE
13	1	RAW WATER SUCTION BREAK	3/4 INCH	TRANSOM, PORT, ABOVE WATERLINE HIGH (CAPPED OFF)
14	1	MSD VENT	3/4 INCH	TRANSOM, PORT, ABOVE WATERLINE HIGH
15	1	PROVISIONAL HEAD INTAKE	3/4 INCH	BOW, PORT (CAPPED OFF)
16	1	PROVISIONAL HEAD EXIT	1 ½ INCH	BOW, PORT (CAPPED OFF)
17	1	LPG LOCKER VENT	3/4 INCH	STBD STERN UNDER COUNTER ABOVE WATERLINE
18	2	DECK DRAIN	3/4 INCH	HULL SIDES ABOVE WATERLINE

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